

JUN 17 1922
In This Issue—"Ask 'em to Buy" Captures a Town

MOTOR AGE

Vol. XLI
Number 24

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JUNE 15, 1922

Thirty-five Cents a Copy
Three Dollars a Year

"Start your car off right—and keep it right!"

"YOU'VE got a brand-new car with a mighty good engine in it. I don't know how familiar you are with gasoline motors, but even if you were one of the most experienced drivers in the world—as good as Ralph De Palma or 'Tommy' Milton—you couldn't safely drive without a Boyce Moto-Meter.

"Until a new motor has been run several hundred miles the parts are stiff, and any number of troubles may happen before you

know it... about the most *common* is overheating. There are more than a dozen different causes for this condition, but there is no way for you to *know* about it until after serious damage has been done... *unless you have a Boyce Moto-Meter.*

"That vivid red column in the Boyce Moto-Meter will warn you the instant your motor starts heating up—fully 15 minutes before you can detect overheating by any other means."

"Ask 'em to buy"—

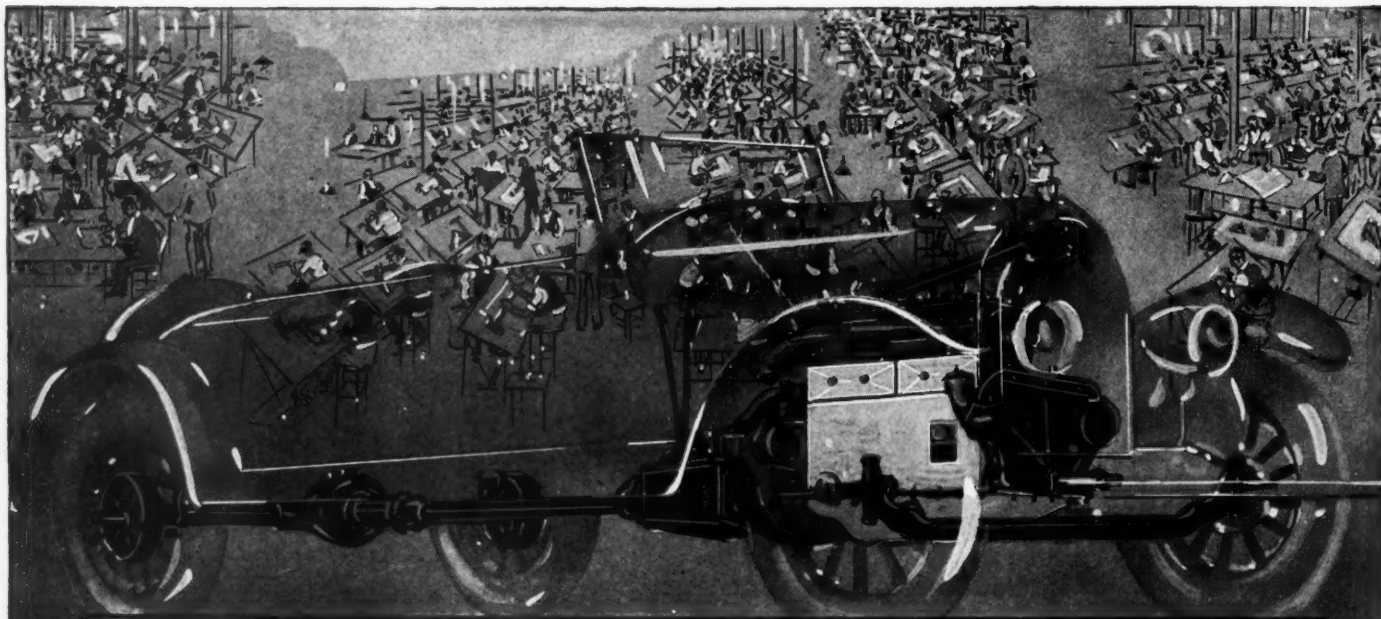


DEALERS

Write or wire for details of the new Boyce Moto-Meter Service Station Appointment.

BOYCE MOTO METER

"Every car deserves one"



Back of the SPECIALIZED Vehicle

—an engineering force that no one organization could possibly maintain

A few years ago the automobile buyer was influenced largely by what he could SEE. But experience has taught him that the things determining performance—real *continuous* performance—are the resources and facilities behind the car or truck.

More and more buyers of cars and trucks are being impressed with the organization back of the genuine SPECIALIZED vehicle—an organization representing the combined strength of the vehicle builder, the great SPECIALIZED unit manufacturers and the parts-distributing stations that dot the world. Dealers' service organizations see the full

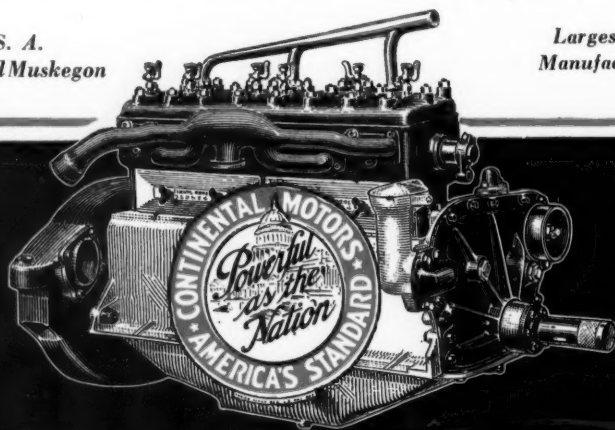
significance of the parts-distributing system behind the SPECIALIZED vehicle—a system that makes instantly available to them any part of any of the SPECIALIZED units and thereby insures quick, efficient, profitable servicing.

Car and truck dealers who ally themselves NOW with the SPECIALIZED vehicle will reap the full benefits accruing from the fast growing public preference for the vehicle whose every unit is a *proven* unit sponsored by an organization of SPECIALISTS—such a unit, for instance, as the motor that bears on its crankcase the Continental Red Seal.

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Offices: Detroit, U. S. A.
Factories: Detroit and Muskegon

Largest Exclusive Motor
Manufacturers in the World



Continental Motors

MOTOR AGE

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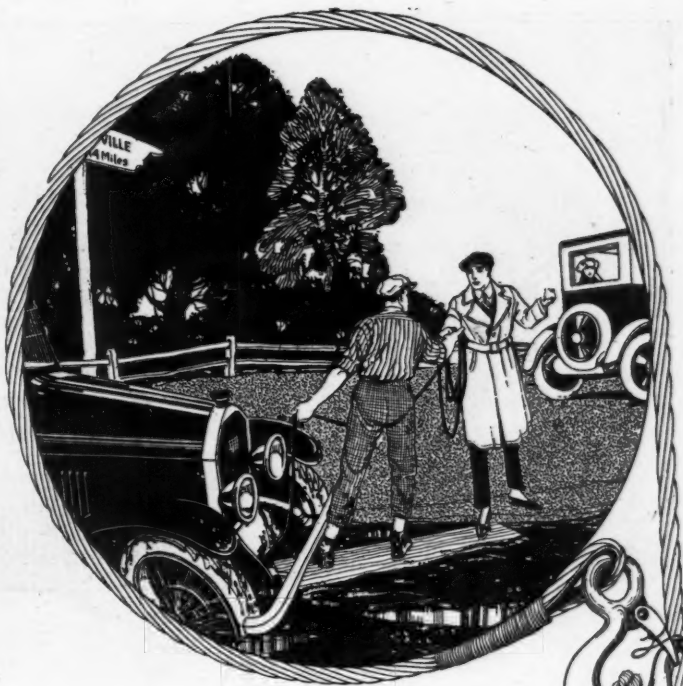
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"I'll Haul You Out!"

Tinkering for hours with a crippled or mud-mired car is irritating and needless. Safeguard against it by always carrying along a

BASLINE AUTOWLINE

Then you simply hail the next autoist, and in a minute or two you're on the way once more.

BASLINE AUTOWLINE is the "Little Steel Rope with the Big Pull." Absolutely dependable, because it's made of the famous Yellow Strand Wire Rope. Snaps on instantly with patented Snaffle Hooks that cannot loosen. In emergencies, can be used as skid-chain. Fits under seat cushion. At dealers, \$4.95 east of Rockies.

POWERSTEEL AUTOWLOCK, another necessity, protects car and spare tire against thieves. Also made of Yellow Strand Wire Rope, with non-pickable spring lock. At dealers, \$2.50 east of Rockies.

POWERSTEEL TRUCKLINE is needed by every truck-owner for heavy towing. It would hold an elephant. Retail, east of Rockies, at \$8.65 with plain hooks; \$10.10 with Snaffle Hooks.

To the Trade:

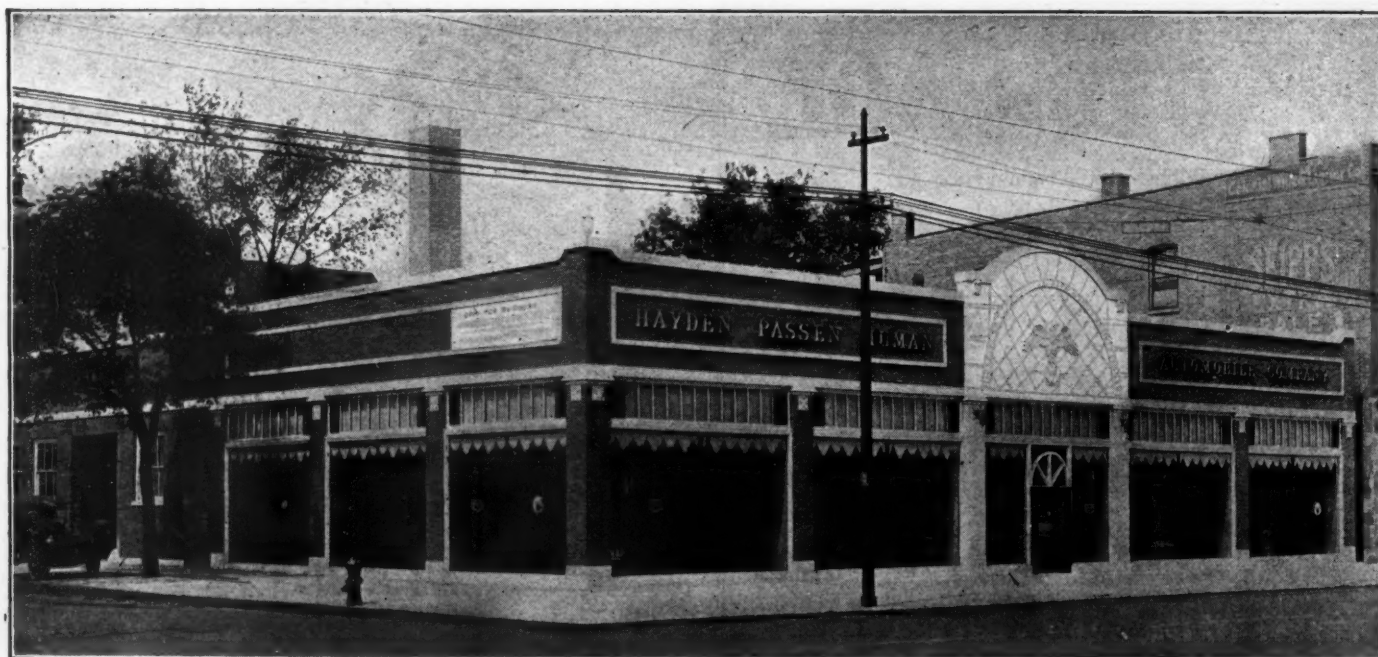
Like all widely-advertised products, Basline Autowline, Powersteel Autowlock and Powersteel Truckline are widely-imitated. But there's a good axiom that can be applied to all substitutes: If the original article were not better, it would not be imitated. Push the 3 B & B products—they're the real thing! There is money in them for you. Write today for our attractive proposition.

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Manufacturers of Celebrated
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D5G



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CHICAGO, ILL.

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A very charming color effect, not susceptible of reproduction, lies in the contrast of the brilliant blue of the lunette over main entrance with the white of the bas relief. This is an interesting example of Terra Cotta's unlimited range in color and form.

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MECCHANICAL excellence in his product no longer satisfies the automobile manufacturer. Having solved the problems of silence, accessibility, lubrication, spring suspension, economy, etc., he is now devoting just as scrupulous attention to the external appearance of the car. All the modern subtleties of design and color evince his purpose to turn out a product as arrestingly beautiful as it is mechanically successful.

Fully appreciating that a beautiful setting enhances an object of beauty, wise automobile men concern themselves quite as definitely with the artistic housing of their displays.

Certainly you have to look no deeper for the reason why today the country is every-

where dotted with Terra Cotta motor salesrooms.

Terra Cotta is made in any form or color the architect desires. It admits of simple or elaborate decorative treatment at moderate cost. It is fire-resistant to the utmost and permanent in finish, color and texture. Should dirt coat the surface, it can easily be washed off with soap and water and the original freshness of the Terra Cotta restored.

If you are planning the erection of a new garage, salesroom or service station, write and tell us about it. We can send you information which may save you time and money when you decide to build. Address National Terra Cotta Society, 19 West 44th Street, New York, N. Y.

TERRA COTTA

Permanent

Beautiful

Profitable

MOTOR AGE



This window display is typical of the changes wrought by the "Ask 'Em to Buy" movement in Albion. A year ago this window looked into a vulcanizing shop, where worn out casings, and tubes and tire dust formed the chief display. There was even a testing tub against the glass. Compare any such window you know of with this one, with its tasty merchandise and fresh flowers. The Hood tire district manager says this is consistently the best window he has seen in a town of this size. It is changed frequently. Clem Wickens, the merchant, says it pays big dividends.

Accessory Business Doubled in Small City By An "Ask 'Em to Buy" Experiment

*Before the Merchandising Movement Was Really Under
Way Bill Martell Tried It Out on Albion, Mich., with the
Resulting of an Uplift of the Entire Dealer Situation in
that Enterprising Town*

By CLYDE JENNINGS

THIS is a story of the longest test of the "Ask 'Em to Buy" movement. It is a story of the functioning of the Albion Automotive Trades Association of Albion, Mich., for the promotion of the automotive trade in that city. It is a story of the bringing about of almost complete harmony where previously there was the usual discord. The situation in Albion is not yet 100 per cent, but the improvement is beyond ordinary means of measurement, and on all sides you hear hopes that the 100 per cent goal will be approached.

The birth of the Albion Automotive Trades Associa-

tion was the first definite step in the "Ask 'Em to Buy" campaign, and this step was unofficial. It grew out of Bill Martell's ambition to prove that he and other men, who were thinking in the same terms he was, were on the right track. The fact that the movement was not officially defined meant nothing to Bill, so he just started it. Albion was the place, for two reasons:

First: It was the first town Martell had visited after he got the big idea.

Second: Martell, after a brief survey, thought the merchants there were not making the most of their opportunity.



A year ago this building with the battery and Reo service signs on it looked like an old livery stable that had been burned out. It made no secrecy of neglect. William Bemer caused it to be painted and he says the signs are a good investment. A year ago Bemer's gasoline pump was not in use. Beyond is the neat building that houses the shop and salesroom of the A. G. Noble Co.

It has succeeded for just one reason: The Albion merchants were big enough to see that the criticisms were well founded and to grasp the opportunity to work their way out.



This tire shop is in a store room built for ordinary merchandising requirements. Until the "Ask 'Em to Buy" story was told it was just a tire shop, in all that implies. Partitions, show cases and a balcony for office and tire space have worked wonders. J. P. Engstrom is all for the new style of doing business. The lower picture does not show the accessory display in Wicken's store, but it does show the tire display and the neat office arrangement and office convenience in the corner. A year ago this was the main room of a vulcanizing dump. The new tires were in the cellar. This year the owner of this store expects to do a \$30,000 business. A fine increase.

What the Albion merchants have done is amazing, and what they hope to do would be more amazing if it was not for the record of accomplishments.

The ten months of steady accomplishment has been made in spite of the handicap of three previous failures to put a trade association on a working basis. The situation is not yet 100 per cent, but a year has not yet ended.

How It Happened

Here is the story of how this all happened. About a year ago Martell was down in Iowa and was called on to talk before an automotive meeting. His talk was part speech and part advice on selling goods at retail. He learned the next day that the part on selling goods had gone big. The other part doesn't matter, as it is not a part of this story.

The fact that his advice on selling goods had been so interesting to the dealers put Martell to thinking on the line of organized merchandising helps. Then he went to the Automotive Equipment Association and found that R. A. Stranahan was about two steps ahead of him, as Stranahan suggested such a department for the A. E. A. Martell fell in line—and came home from Mackinac Island all enthusiasm. While the A. E. A. committee was engaging Ray Sherman to promote the merchandising movement, Martell was cleaning up his desk and hoping for a chance to start something that would prove to the Mackinac Island doubters that the merchandising idea was a step in the right direction.

Sherman went on his job as organizer of the merchandising work Aug. 1, and the same week Martell was called over in Michigan by Frank McMahon, one of his salesmen. Albion was one of the towns he visited. Martell, like other sales managers, is very likely to judge a town by the orders. He was somewhat surprised to find Albion such a pretty, hustling city. He had not so pictured it. When he was assured that E. D. Kimball & Co. were getting their share of the business there, he conceived the idea of creating more business by a bit of education.

All the Dealers Attended

So Martell and McMahon arranged for a dinner at the hotel that night and all of the dealers came. Martell told them the story of the "Ask 'Em to Buy" plans as outlined before the A. E. A., and added a good many ideas of his own as to proper retailing. He told them true stories of what some dealers had accomplished by soliciting trade at gas pumps and what neat window displays, clean stores and specific advertising had accomplished for merchants who had tried it. He contrasted automotive accessory merchandising with that in other lines and described what a dealers' association could accomplish if all got behind the movement.

Martell thought there was a dealers' association in Albion and had so spoken, so when informed that there was none, he

suggested that one be formed then and there. When the meeting adjourned, after midnight, the "Ask 'Em to Buy" movement had taken root and an entirely new deal on association work had been started.

When Sherman took up his duties at the A. E. A. headquarters, a report of this meeting and an outline of Martell's talk was one of the first documents to reach him. And that is why and how Albion, Mich., became the pioneer in this movement.

And It Works

Martell tells some other interesting incidents of this meeting. The next morning he was waiting in his room for the breakfast call when McMahon, who was looking out of the window, called to him. Across the street he saw one of the dealers talking to a Ford owner at the Standard Oil pump, and they knew by the gestures that he was asking the man to buy. Martell hurried down to the man's store and saw him complete the sale of three items. "By gum, it works," said the dealer with a smile, as he put the money in the cash register. On his calls that morning Martell found evidence in practically every store of merchandising effort. One tire man was washing his windows. One dealer was shaving. At least three show cases were washed that day.

So much for the start.

Has it paid?

The answer was sought in Albion a few days ago. There can be no mistaking this answer. An inspection of the show windows will answer that. How long will an accessory dealer bother to bring fresh flowers to his store each day for window dressing purposes unless he is convinced that it will pay? Two dealers in Albion have been doing that for several weeks.

In a day spent in Albion watching dealers make sales, not one had to dust the article called for before he offered it to the customer.

In every store where accessories were sold there was an attractive display to greet the customer, and in all but one or two cases there were window displays.

In every store plans for the future are being discussed.

Sales Increase by Every Dealer

The chief note of progress, probably, is sounded when volume of sales is discussed. Each dealer will tell you that more dealers are competing for accessory trade this year than ever before, but that HIS sales are greatly in excess of any previous record. There is, of course, but one answer, and that is that the total accessory trade of the city has grown more than the trade of any one dealer.

No one wanted to estimate the increase of the total accessory trade of the community against a previous year. One thing all the dealers are certain of:

That since they have been showing their goods they have

sold to persons who previously bought in cities or of mail order houses, because they did not know local dealers carried the stock. Also, the prices they are putting on their goods compare well with reliable goods elsewhere.

When the first year's history of the Albion Automotive Trade Association is written it will be one of progress. The chief thing that has been accomplished has been a good fellowship. This has been quite well established; so well in fact that the 15 men who compose the membership of the association sometimes meet at dinner and spend the evening together, although they know before coming that there is no business on for the evening.

A. G. Noble was made president of the association when it was organized, and still serves. William Bemer is secretary. An examination of the history of the previous association told the leaders of the new organization that the troubles had been caused by the drafting of strict rules of business and then of bad feeling when some member was reported to have broken one of these rules.

No Standing Orders in Association

As a safety move, it was decided not to draft hard and fast rules, and to date there are no standing orders in this association. In the place of such rules or orders, the members gather around the table and talk about such things as are on their minds.

Price cutting has been a topic of such a conversation, but no effort has been made to reach an agreement as to what should be charged. A discussion as to the actual cost of certain ordinary operations has been of great educative value to some members. This was especially true in the matter of tire service. It was found, as always, that some members had under estimated certain items of cost.

How well this understanding is established is illustrated by this incident:

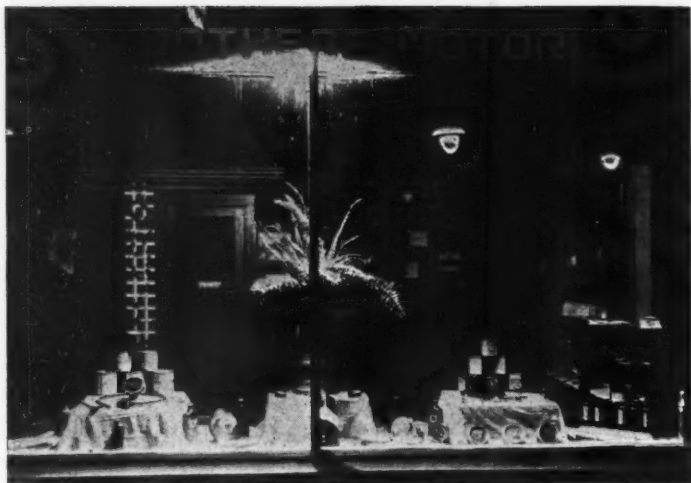
A car owner having some work done in Bemer's garage asked the price of carbon removal. He reported that a rival company had burned out carbon for him two months before for less than half the price Bemer asked. Bemer discussed the question with the customer for a few minutes, endeavoring to convince him that he was mistaken, but at no time did he offer to meet the price. He told the customer that if the carbon had been burned from his engine two months before it should not need it now.

No Hasty Judgments

After the customer had withdrawn, Bemer explained somewhat. He said he would rather believe the dealer than the customer. He knew the man reporting this price to him was honest, but sometimes confused. Consequently, he had not intimated to him (as he usually did under such circumstances)



The use of show windows is indicated in this building, a part of the Albion Motor Row. A year ago these windows were going to waste. Now they are paying profits.



Louis Striker, the Dodge dealer, has some fine window displays these days. He formerly neglected the windows, except to keep them clean. Now they are paying a big rental on accessory profits.

that he was misrepresenting circumstances in an effort to get a cut price. "I will see that dealer today and will find out what happened," said Bemer. This is not an isolated instance, according to Albion dealers.

There are other accomplishments to the credit of the association. One of these has been especially gratifying. In some of the nearby towns are some cutthroat dealers who sell any sort of merchandise at extremely irregular prices. These merchants formerly advertised in Albion papers. A committee of the association discussed the problem with the local publishers, told them of the sort of merchandise offered, explained the object of the local association to promote clean merchandising, and the outside ads ceased to appear.

Reducing Credit Losses

During the dull season of the winter a plan was worked out whereby one shop would stay open for emergency calls on Sunday. This was highly satisfactory to all but one member firm. For a time this firm ceased attending meetings, but he apparently works in harmony on other lines. The view taken by this dealer was that the others were trying to run his business.

Soon after the association was well under way, "Strictly Cash" signs appeared in all shops. No one was pledged to go on an all-cash basis, but one thing is very evident. In the discussion of bad debts a pretty definite line as to which car owners were clearly in the "Strictly Cash" class was drawn. No dealer was asked to turn down his old customers with whom he had been doing a monthly settlement business. This credit stand has been enforced with reason and is producing good results.

Recently the Business Men's Association has solicited the Automotive Trades Association to come into the larger organization. This invitation is under consideration. The honor is appreciated, but the automotive men want to make some inquiries first. They want to know why some business houses in other lines show a decided inclination to employ repairmen who have no established place of business and why some of them go out of town for automotive supplies. Also, they want to know if the larger organization really looks upon the automotive vehicle as legitimate property or just another luxury to be taxed and blamed for all business ills.

Repairman Is Big Problem

An invitation from the Michigan State Automotive Dealers' Association also is under consideration. There was a feeling that the Albion association was not interested in the state-wide work, but this is changing. A consideration of the situation has caused the members to study somewhat the need of proper representation during the legislative periods and also the need of uplift in various neighboring cities that are engaging in sales in a competitive territory. The state association can, of course, help in both of these situations. The Albion dealers had not until recently discussed to any extent the sales

resistance that would be created if some one did not curb the legislation for increased taxes on automotive products and the restriction of driving privileges.

The repairman is the biggest problem in Albion. There are a great many mechanics in the city, and it seems to be difficult for the car owner to understand that a factory mechanic is not always a good maintenance mechanic. One of the tasks for this summer is a campaign of education on this score. A start will be made with the business men. Also, the association thinks a statement of the case to the jobber who supplies these men with the small amount of goods they buy might bring some results.

The most visible of all effect of the "Ask 'Em to Buy" movement in Albion is the changed appearance of the salesrooms. Before Martell made his talk there were three vulcanizing shops in Albion. Each of the three sold tires, but that fact was not much in evidence. The prominent feature of each place of business was the tire dust. Each shop consisted of one room with some machinery and a lot of old tires. The windows were junk storage places.

Now it is very different. The workshops have disappeared. They have gone behind dustproof partitions, and the front rooms have become salesrooms for tires and accessories. The windows are far above the average of the better class of tire store displays.

Changes in Tire Business

Clem Wickens, one of the leaders in this new order of things, recently offered \$25 for a picture of his place taken three years ago. He says he wants it to compare the disorder of that day with the order of today. Wickens is set for a business that will go well above \$20,000 a year, and he is just getting set on the accessories. His repair business has dropped off somewhat, as tire prices have dropped, but by adjusting prices in the shop to tire cuts, he has kept some business going. Tube repairing is as brisk as ever. Wickens has taken the lead in window dressing, and his friends say he has discovered a natural talent in that line. Since cleaning up his place of business and beautifying his windows, Wickens has discovered that a good many women buy tires.

William Bemer, former mayor and leading blacksmith, is another who has taken this movement seriously and who has profited. A year ago he was in a building that had been in a fire and made no secret of it. There were a good many marks of wreckage about and a salesroom that was a joke. Bemer was the first man to go out to a gasoline pump and ask a car owner to buy. He had to go to a gas station pump because he was not selling gasoline from his own pump then. Too much bother. After two or three visits to the other pumps, he had his own pump primed, and it has been running ever since.

An Idea from the Hardware Store

Bemer cleaned up the old building, painted it in true "Ask 'Em to Buy" style, remodeled his office and salesroom, and has all of his merchandise in sight of the customers. He has one



The Albion Motor Sales Co., Ford dealers, are not aggressively pushing accessories for reasons of their own, but no customer who enters the big salesroom, or who comes for parts, can escape seeing a tasty display of such parts and accessories as are offered for sale. Results have convinced these dealers that they will enter the accessory field later.

novel feature in a notion display stand that formerly served a hardware store. It is of fine workmanship and supplies readily acceptable storage for 100 small articles.

Bemer's experience as a blacksmith has been a helping hand for the maintenance work in Albion. His knowledge of spring repair work and his ability to shape brackets and similar forge work has come into play many times in case of need.

Art Noble is planning for the day when he partitions off the car sales department of his large and orderly establishment. Noble's trouble is that he is kept busy with troublesome electrical jobs, to which wireless apparatus has been added, by insistent neighbors. Noble was an automotive electrical instructor in the army, and this fact has spread his fame. His firm sells the Maxwell, and he has great faith in the future of car sales.

The Idea Applied to Selling Cars

Harry Richards, who has been the Ford dealer for several months longer than this "Ask 'Em to Buy" effort has been under way has not made the effort in the accessory line that his neighbors have, and yet he has felt a decided increase in this line of this business. Richards has devoted more of his time to "Ask 'Em to Buy" cars. He has four salesmen combing the territory for sales of cars, trucks and tractors and he says that applied to the complete vehicle unit, "Ask 'Em to Buy" is a most decided success.

Each morning his sales force meets with one of the executives of the firm in a conference from 7 to 7:45 a. m. to go over the work of the day before. By this method, the Ford business has jumped ahead to the point where deliveries even on tractors proves sometimes to be embarrassing. Richards holds the opinion that "Ask 'Em to Buy" is an excellent thing for the car dealer as well as the accessory dealer. He is enthusiastic and earnest over the work of the association.

D. M. McAuliffe came into the car trade through the implement dealer route. He has sold to the farmers of this community for years and has been interested in car sales for

quite a number of years. He sees in the automobile dealer business a future for his son, who soon will be able to take his place in the business. McAuliffe is looking forward to the time when factories are more settled in their dealer policy, so that he will feel safe in building the proper kind of an establishment.

He says that at present the dealership is too insecure, as the factory representatives are given to intimating that changes in policy are in prospect and, unless insured a stable proposition, it would be quite foolish to invest \$40,000 in bricks. McAuliffe is selling Chevrolet and Buick cars, both comparatively new accounts with him.

J. J. Engstrom, another tire dealer, has profited much from this movement. His store, with its carefully partitioned off shop, his neat salesroom, his balcony for office and storage purposes is quite metropolitan in appearance. His windows well display his line of tires and accessories.

Bargain Day in Albion

On the day this article was written, the Albion Business Association was holding a market day. On this day, which is each alternate Thursday, the merchants are urged to offer special trade drawing bargains. Several of the automotive merchants had such bargains that day and in almost every case their bargain stocks were completely sold out. William Bemer, for instance, offered a special in the way of a sponge and chamois for 98 cents, which was practically wholesale price. This bargain brought a number of buyers to his store.

At this time the dealers were discussing plans for the June meeting. They had decided that instead of the usual evening dinner, they would spend the day at Duck Lake, a popular resort which is a nice drive from the city, take their wives and boxes of lunch along and put in the entire day getting acquainted even better than they now are.

And, strange to say, the Albion dealers have not yet seen the "Ask 'Em to Buy" film.

ALBION is a pretty, well built city of 10,000. The streets are lined with handsome elm trees and the people generally proud of the city.

It is in the midst of a farming country and is the home of several metal trades factories, most of which are a part of the automotive industry. Castings, bolts and such materials are made there and shipped to vehicle manufacturers. Most of these factories were compelled to shut down when the financial blizzard swept the automotive industry. When trade revived these factories had to wait for the large inventories to be used up. They are running now, however. During the dull period in the factories, the farmers near Albion, as elsewhere, were hard hit by the slump in prices for their products. So Albion was pretty hard hit, but it never lost heart.

THE dealers in Albion have not kept books on their accessory trade, so that it is impossible to get exact figures. Some safe estimates can be drawn, however:

The accessory business in Albion for a year previous to the "Ask 'Em to Buy" was probably \$11,000. For the current year it will exceed \$25,000.

Several dealers have doubled their orders to the wholesale houses during this year, as compared with a year ago, and their stocks are cleaner. The first two months of this campaign was required to sell the dead stocks on hand.

The dealers expect an even better year next year, due to the education of themselves and their customers this year. Car owners in that community are just beginning to appreciate the use and appearance of the articles offered to them.

A Census of the Petroleum Refineries In the United States

Petroleum refineries in the United State on Jan. 1, 1922, numbered 479 completed plants, with 30 additional plants in process of construction, according to a statistical summary prepared by H. J. Lowe, petroleum economist of the Federal Bureau of Mines. The indicated daily refining capacity of these plants is 2,164,050 barrels of crude oil.

The tremendous increase in the extent of the petroleum refining industry of the country is shown by the fact that in 1914 but 176 petroleum refineries had been completed. Within eight years the number of refineries has been increased by 172 per cent.

Texas at present leads all other states in the volume of oil refining business,

with 63 operating plants, with a daily capacity of 345,150 barrels; in addition, the state had on January 1, 46 refineries in shut-down condition, while nine other plants were being built. Oklahoma is the second state in number of refineries, with 54 operating and 43 shut down; operating plants in this state had a daily capacity of 234,650 barrels. California, with 34 operating plants, was refining 314,360 barrels daily. Pennsylvania had in operation 48 plants, with a daily-refining capacity of 114,930 barrels. New Jersey, with but five refineries, treats 224,000 barrels of oil daily.

The importance recently attained by the state of Louisiana in this industry is indicated by the fact that 14 refineries were treating 114,350 barrels daily, while 11 plants were in shut-down condition.

Kansas, with 19 operating plants, was refining 57,650 barrels daily; Illinois, with 12 plants, was handling 62,050 barrels; Wyoming, with 11 plants, was refining 89,900 barrels; and Indiana, with five plants operating, was handling 54,300 barrels daily.

Of the 479 completed refineries in the United States, 154 were in shut-down condition at the first of the year. The daily refining capacity of these non-operative plants was 254,610 barrels, or approximately one-eighth of the entire refining capacity of the country. The 30 new plants in process of construction will, it is estimated, add 59,950 barrels to the country's daily refining capacity.

Copies of the directory of petroleum refineries in the United States may be obtained from the Bureau of Mines, Washington, D. C.

New Developments in Tractors, Cars and Equipment

Case Has New 12-20 Kerosene Tractor

THIS latest addition to the Case tractors, the 12-20, is built along designs similar to the other sizes. The idea that prompted its production was to have a tractor of practically a 2-plow size, yet one that would pull 3 plows under ordinary conditions. This tractor is recommended to handle a 22x36 thresher with all attachments, in ordinary threshing. It will operate a 12 or 14 inch silo filler, elevating to the average silo. In plowing it will handle three 14-inch plows under average conditions, plowing 7 in. deep. In heavier work, such as breaking, two 14 in. plows are recommended. It pulls an 9 ft. double disk in high gear in the average field, as well as a 12 ft. grain drill and an equal width of harrow.

This tractor has a one-piece frame that holds all bearings, shafts and gears in alignment. The frame is rigid and all parts are so balanced that there is very little vibration, it is claimed. All working parts are enclosed in dust and dirt proof housings and operate in oil.

The engine is of the vertical four cylinder valve-in-head type, the cylinder bore being $4\frac{1}{2}$ in. and the stroke 5 in. At normal governed speed of 1050 r. p. m., a maximum of 25 h. p. is attained.

Renewable Cylinder Barrels

The cylinder head is removable for cleaning out carbon or grinding valves. The entire surface of each combustion chamber is machined smooth, tending to eliminate carbon. Adequate cooling space is provided around valves.

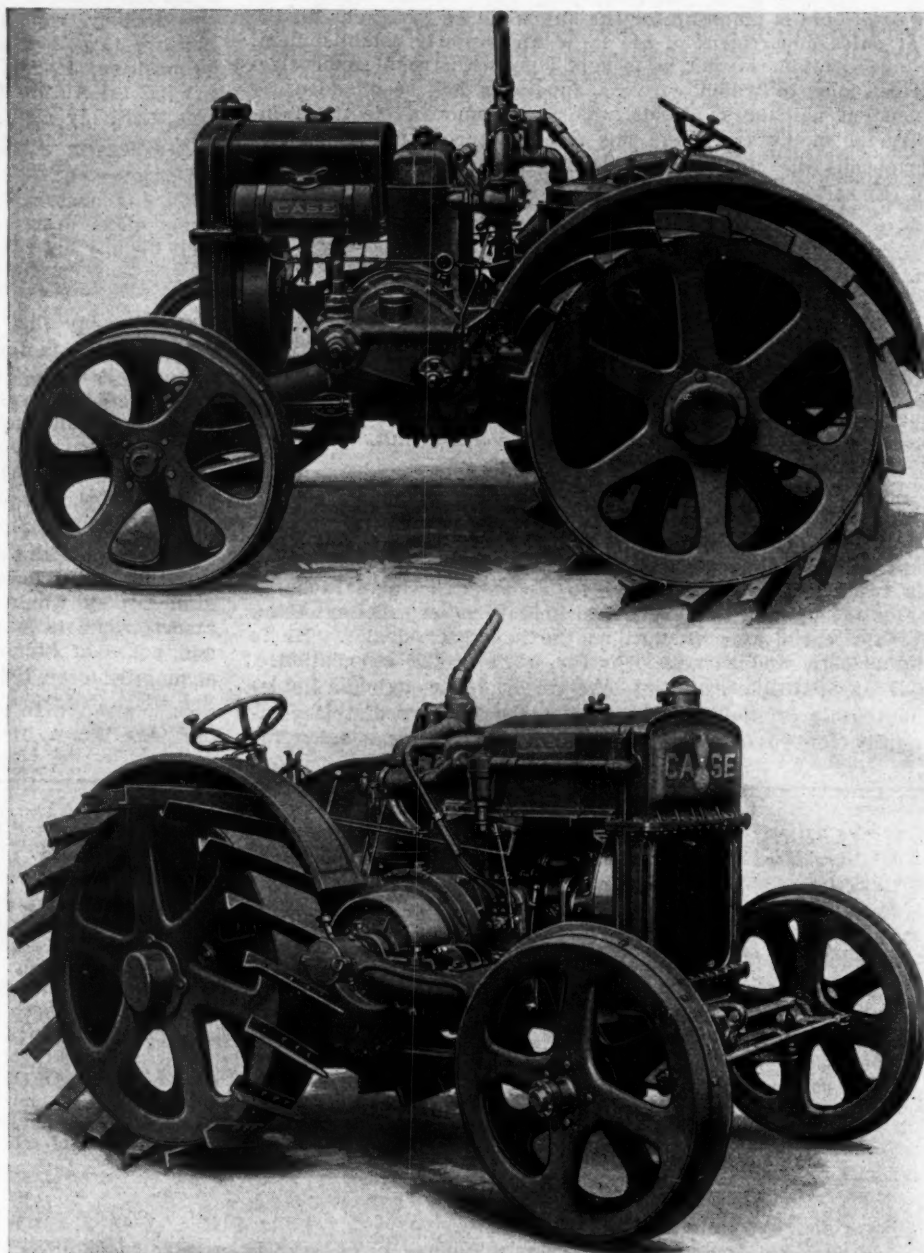
The valves are all contained in the head which can be removed and taken to a bench where the valves can be ground most conveniently.

The valves are operated by drop forged steel rocker arms with bearing surfaces hardened and ground to resist wear. The entire valve mechanism is enclosed in a dust-proof steel cover and all parts are lubricated by oil spray from the crank-case.

From a maintenance standpoint, the renewable cylinder barrels are an important feature. In case of excessive wear or damage due to the lack of oil or water, it is not necessary to make an expensive replacement of an entire cylinder block. With this construction the damaged barrel can be replaced in the field.

A further advantage gained by the use of renewable cylinder barrels is accessibility for cleaning the water jackets. The whole interior of the water jacket is exposed when the barrels are removed.

The belt pulley is mounted directly on an extension of the engine crankshaft so that no power is lost by transmitting through gears. The extension shaft is mounted in bearings on both sides of the



New Case 12 20 tractor. A new style of wheel is used on this model, the open disk type giving strength without undue weight

pulley, which will carry very heavy drive belt strain. The pulley is located on the same side of the tractor as the steering gear so that it is in plain view of operator when lining up to a belt driven machine and the tractor can be conveniently backed up into the belt by use of its regular transmission.

A pulley brake is provided which acts on the face of the belt pulley. It can be used to stop belt driven machinery quickly, or, when the gears are in mesh, as a road brake for the tractor. This brake is operated by the same lever that operates the clutch.

On this tractor the Case company has adopted a new style of wheel construc-

tion, that is, the open disk wheel, said to be of great strength and rigidity without excessive weight. Spokes and felloes are formed from a single steel plate, with a flange at the edge to which the tires are riveted.

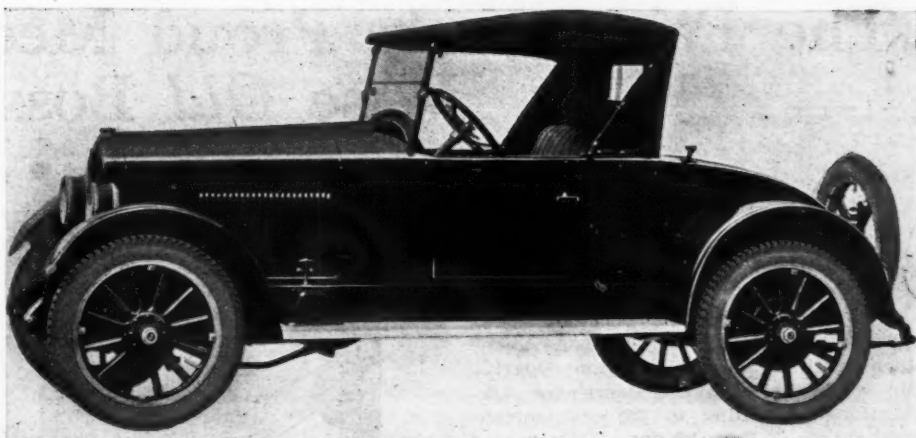
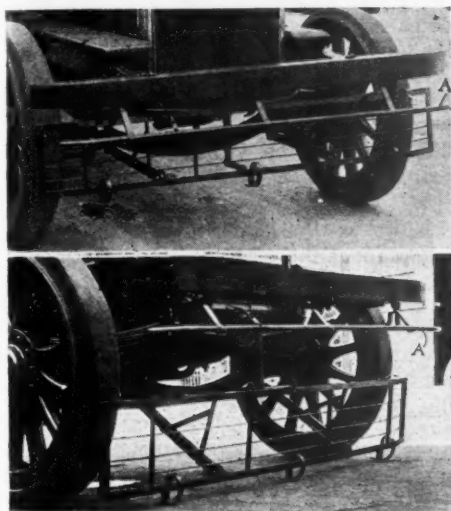
The steel tire used on drive wheels is $\frac{5}{16}$ of an inch thick and that of the front wheels $\frac{3}{16}$ inch. The drive wheels are 42 in. in diameter with a 12 in. face. The use of wide wheels avoids any tendency to pack the ground.

Angle iron grouters are regularly furnished. These grouters are of sufficient number and so spaced that the wheel will ride smoothly over a hard road. The grouters are bolted on—not riveted.

Pohlig Automatic Bumper Fender

THE action of the Pohlig Automatic fender is dependent upon a trip bar, which when struck by any object automatically releases the fender, the latter dropping to the ground. After the fender has dropped the trip bar instantly moves to the rear of the bumper to perform its usual function of protecting the front of the truck or car and without damage to the trip bar or fender.

The bumper, of proper resistance in relation to the car, is so positioned that both the car and the fender are protected from the usual traffic bumps. The passenger car bumpers have spring members to absorb the shocks. There is no stationary projection on a line with or in front of the bumper. For passenger cars the bumper is finished in heavy nickel plate and the fender in black enamel.

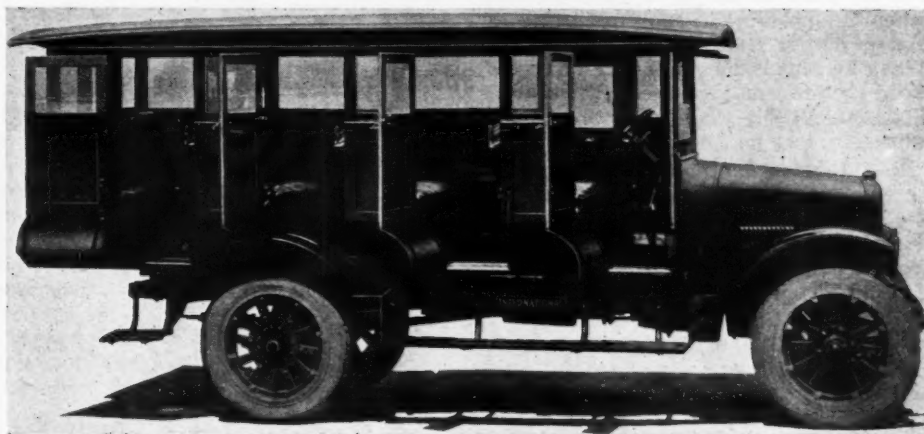


New Jewett Roadster

THE latest addition to the Jewett line is a roadster having a single straight seat, wide enough for three adults. It is featured by a large baggage compartment in the rear, and by curtains that open and close with the doors, giving

excellent vision and a weather-tight fit. The upholstery, as in the touring car, is cowhide.

The price of the roadster is the same as that of the touring car, \$1,065 f. o. b. Detroit.



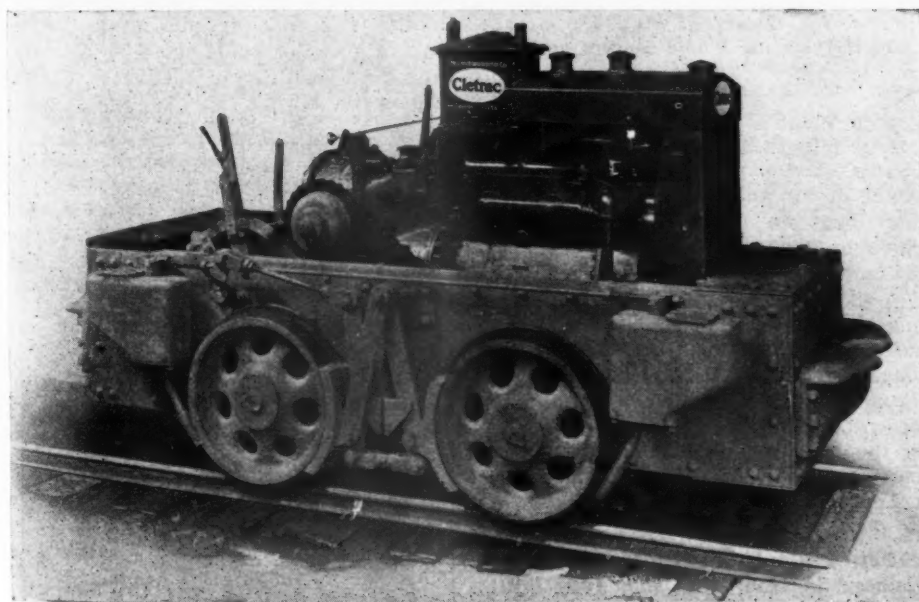
International Cross-Seat Bus

THE cross-seat bus placed in production by the International Harvester Co. is particularly well suited for suburban and interurban bus line and for consolidated school service. It can be loaded and unloaded rapidly and gives the passengers comfort and a natural position during their ride, it is stated.

This bus is built with two different size bodies, with their four or five cross seats. Either body can be mounted on the 3,000-lb. or the 4,000-lb. chassis, while the smaller body is light enough for use on the speed truck chassis, as shown by the accompanying illustration.

Each seat will accommodate three or four adults, or four or five children, which gives the four-seat bus a capacity of 10 to 14 adults or 18 children, and the five-seat bus 13 to 18 adults or 24 children.

There is an individual door at the right-hand end of each seat and an extra door for the driver at his left. There is a drop window in each door and also at the left of each seat, so that the bus can be made comfortable and airy in the hot summer weather.



Cletrac Engine Powers Atlas Locomotive

The Atlas Car & Mfg. Co. of Cleveland has brought out a new light industrial locomotive in which is installed a tractor power plant. The model F Cletrac minus its side frames, track, seat and steering wheel, is set bodily into the sturdy frame, giving an unusually light yet powerful locomotive. It is designed particularly for road construction, industrial railways and general plant hauling.

The Fable of the Proud Mechanic and the Wise Old Boss

By TOM WILDER

With Apologies to George Ade

ONCE there was a Bunch of Human Ingenuity Who Twisted a Wicked Monkey Wrench. He had been unscrewing and screwing up Nuts ever since ignition was called Jump-Spark, and was considered the Berries on all questions pertaining to the economical overhauling of Buzz-Wagons. His experience was so far reaching and his Memory so perfect that he could visualize every nut and cotterpin in the Alimentary Canal of any Buss from a One Lung Cadillac to a Packard Twin Six and tell an assistant in exactly what order the Appendages must be removed in any Major Operation.

He never had any Parts Left Over or put any back up-side down, consequently, when he Spoke-to-er, she turned over or got up on her Hind Legs at his bidding. When he Finished a job it was Done and Good as New and never came back until Old Man Mileage had again got in his work.

Ben was the Pride and Drawing Card of the shop in which he worked. The Boss always told a prospective customer about Our Expert or that "our Repairman is the best in the Middle West," but somehow no matter how rich the Lode or how much Pay-dirt was shipped, Ben's envelope never Assayed more than 25 or 30 Berries. He was even Laid Off during Dull Periods until he threatened to go to Work for a rival, when he was put on a Salary which sounded fine but Didn't mean Anything except steady work and a two weeks Vacation with pay in the Winter when there was No Place to go.

However, he managed to get along,



When Ben discovered his Department was carrying the Whole concern he got Chesty

also to Plant a little Jack, as he was serious minded and seldom if ever Sat In at a Game or played the Ponies. The extent of his gambling was the annual shop Pool on the Indianapolis Race, where he always invested one Semolian and never won.

In the course of Events there came a time soon after the World War when business was Shot full of Holes. The concern Ben worked for hadn't sold a car for months. All the office and sales force that hadn't been laid off Sat around on the Mourner's Bench and-pared its finger nails and tried to remember how it Looked to see a Prospect walk in at the door.

There was only one Bright Spot on the business horizon, the shop was still functioning, thanks partly to the fact that when Fewer New Cars are sold, more old ones must be given a Shot of Elisor to keep them Performing, and partly to Ben's reputation as a Repairman. Eventually the Sale of parts and

the Service Department were bearing the Overhead and the Whole Shebang.

As Ben became Hep to all these facts, his perfect 36 increased to about 44. Aesop's toad was a Piker at expanding beside Ben, who thought he, instead of the Boss, should be the Guiding Light of the Firm and be rewarded Proportionately.

The Boss argued long and Eloquently about Losing money, Overhead, and a Bunch of other things that didn't interest Ben, who always came back by Point of Order to the Original Question. When the Final Ballot was Counted, Ben was defeated by one Vote, so he packed up his tools and Blew.

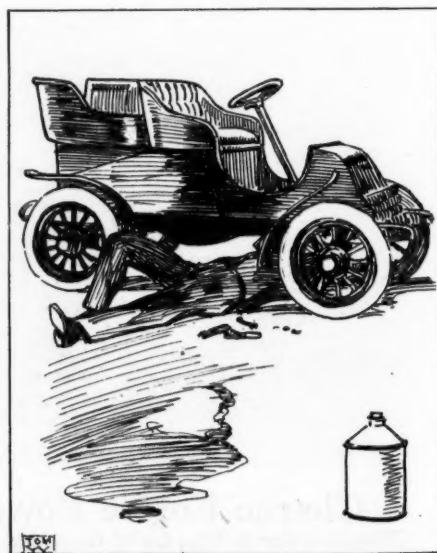
Ben expected to see his former Boss go Down for the Full Count. The business was now Gasping and Groggy and all Shot but Service. With the Brains of Service gone, he might as well close up shop.

However, Ben was too busy to Worry much about the other Fellow. He found an old store Building that he could rent Reasonably because the district had grown away from it. It was Narrow and Dark and run down and had nothing to specially Recommend it as a repair shop, but Ben figured his Personality would supply all deficiencies, and beside, being inexpensive, his Customers would reap the benefit.

It was a good line of Argument, but in using it Ben put the Micrometer on his own business Calibre. What he didn't Realize was that by picking a Cheap looking place he would establish a Come On for a Cheap line of customers, Ginks who were always Shy of Coin, who



The old Store had nothing to Recommend it as a Repair shop



He started his Career in the Days of the One Lunger



The old boss played solitaire with the Card index and found out More about costs than Ben had ever Known

always Welched at the charge and who were Slow Pay.. Never having had experience in collecting, he trusted every one and soon became a Mark for Hard Eggs.

He managed by Hard Work and Long Hours to keep a little ahead of the game, but being one's own Boss failed to have the Glamour he had anticipated in the role. He was tired and worried and not as Good natured as of old; he expected as much of his men as he himself could do, and when they Failed he was irritated, which was Most of the time.

He was impatient with customers, too, when they didn't Savvy his diagnoses or seemed Skeptical about his estimate of the cost of a job. Instead of selling them, he invited them to Pull their Freight. He was rapidly becoming Soured, and while he still continued to Do his work well, he seemed Utterly unable to steer others, and instead of Kid-ding his assistants into his way of doing he antagonized Them. He thought he had to Stay on the job to See that it was done right, when he Should have been out Mixing and Jollyng his trade. He was right, too, for having a One-Man organization, his assistants were With-out Ideas or initiative. They always laid Down on a job rather than get Bawled Out for doing it wrong, consequently when He was out, work lagged.

But, how about the poor old Boss whom Ben had deserted on the Brink of Oblivion? Was he on the rocks? He was not! Being a wise old Bird, he wasted no time in overturning a lot of Ben's one-man methods and Starting some of his own pet theories. He knew that while Perc Chamberlain and other eminent authorities were advocating the Flat Rate System, Ben had insisted there was no sense in trying to hang a Flat Rate on a Packard and a Chevrolet alike, and had refused to consider it.

Now, the Boss had never set up a bearings of an engine or Ground In a valve in his life, but he Dug Up all the shop records and started playing Solitaire with the card index. He started compiling Costs on individual operations and

groups, and when he was through Taking Evidence, Ben's case was Thrown Out of Court, for he proved that Ben was a Poor Guesser and lost money on his jobs as often as he made a Profit.

He started a little Advertising campaign to keep the force busy, and Filled the shop so full that they were obliged to turn Away all but their own cars, thus making it easier for the men to do their work accurately and quickly, and simplifying the Flat Rate. He thought of Hanging Up prizes for the invention of systems that would lower operation costs, but finally decided to Put it Up to the men on a piecework basis. In this way the Boss couldn't loose and each man must use his Bean to invent equipment that would Cut the time and pile up the Cart Wheels. To men who showed no inclination to Pep Up he gave instructions in the gentle art of Walking the Plank, or, in other words, gave them a Vacation Without Pay.

Thus by the Survival of the Fittest he built up a service organization of live wires, all selected for some special Ability, but Harness Broke to produce a well balanced, even pulling team.

It proved a long Cold winter for Ben, but the old Boss ran true to name and was Setting Pretty on the crest of the returning wave of prosperity.

Moral: When You cut Yourself a Piece of Cake, be sure You know how to Handle the Knife to get some of the Frosting.

How the Syracuse Automotive Service Association Is Benefitting Its Members

THE Automotive Service Association of Syracuse has accomplished much good for its members. In the first place, the service managers, parts managers and accessory house managers were not very friendly with one another. It was often very difficult for a service manager or a parts manager to secure parts of a car for overhaul work other than that which he represented. Many unsatisfactory matters came up between service managers and accessory house managers with reference to discounts

and special favors granted some as against others. One of the greatest achievements has been in getting these fellows all together on a friendly plane, which has eliminated all misunderstanding. As "Bill" to "Jack," they get what they need without any friction and its subsequent unnecessary delay and added cost.

Another achievement was putting the majority of the maintenance stations on a cash basis. It took some time, but a number of dealers will tell you that it saved them thousands of dollars.

Since the organization of the association, the Y. M. C. A. has started a real automobile school, and the association has furnished considerable material and assistance as to courses to give the students. There is a permanent committee that works with the director of this automobile school.

Meetings are divided into two parts: The first half is given over to educational lectures and moving picture films; the second part is purely entertainment and get-together for the men.

Among the speakers have been Harry Cobleigh, Percy Chamberlain, G. T. McFarland and others of more or less prominence in service fields.

The association has shown Goodyear tire films, North East films, Dodge Brothers films and one or two others. Every summer an outing is held in a nearby resort.

The service association has its headquarters with the dealers' association, and, in fact, owes its existence to that organization, and unlike some other organizations, it was organized through the efforts of the dealers.

Syracuse Automobile Dealers' Association, Howard H. Smith, Sec.

R. T. Walling, proprietor of the Malone Filling Station, at Malone, Tex., recently took up the study of radio and installed a receiving plant in the rest room of his station. When the radio station of the University of Texas began broadcasting the markets each day for the State Department of Agriculture, Walling saw the possibilities of serving the people of his community and thereby placing his business in closer touch with them. He tuned up his receiving apparatus and each day between 3 p. m. and 5 p. m. there comes to him the markets of the various products of the state. This is usually preceded or followed by a musical program. He soon found that the people of the town and the farmers for miles around were deeply interested in the market quotations and the musical entertainment.

Walling gives free information as to market prices of products when called upon by telephone patrons in the rural districts. He also copies the markets as they are read off to him each day and posts them on a bulletin board in front of his station for the benefit of passing farmers and others who may not have been present to hear the quotations as they came in by radio.

The 1922 Model of Tractor Dealer

A Big Opportunity for Profit and Service Lies Ahead for the Men Who Get the Broad Picture of Practical Methods of Agriculture—Necessity of Dealer Organization Work Emphasized

By GUY H. HALL *

Manager, National Institute of Progressive Farming

LET'S back up and look the tractor business square in the face; do it without blushing. Let's go back, clear back to the first ones that rolled out in mass formation, threshing machine size, and started us talking the "HORSELESS AGE." We all liked that term, didn't we? At that time we dug into the statistics of the United States and the rest of the world, found out the Old Dobbin census and figured how many acres of perfectly good food-land the "old nag" took every year for feed. Then there was all the labor wasted on feeding him, not to mention such items as manicuring his nails, hitching and unhitching him, and playing the chambermaid role. Gosh, it made a fine set of figures didn't it? My! how we did roll those figures around in print!

And then we went out to sell those pioneer tractors to average farmers with that line of talk!

Sure; we were going to, REVOLUTIONIZE farming over night!

We forgot that from the days of the first self binder and the check row corn planter, every piece of advanced time-saving farm machinery had to pass through the experimental stage and then prove itself in the hands of the American farmer. We waved a willowy wand in the wind and the tractor was here, was it not? Yes, it was NOT!

War boomed the tractor business; tractors sold themselves faster than the factories could turn them out. "More food; we must feed the world armies and most of its civilians as well." That was the cry. Tractors were born and left without parents to look after them and keep them on the straight and narrow path. They hurt the tractor game. Then, it was everybody for himself.

WE DIDN'T SELL THE TRACTOR, did we?

No! And did we sell Jones' tractor by knocking Smith's and Brown's and Green's? Did we in our advertising copy put in the farm slant like we are featuring to the farmer today? We are not criticizing the mediums of advertising, nor the basis of the ads, nor the style; nor the technique of the advertising men, for that cannot be faulted; but, we believe this point should be brought home now and the tractor advertised and talked from the farmer's standpoint.

Advertise with a "Farmer Slant"

Why haven't we advertised and talked the tractor from the farmer's standpoint? We have been wasting much of our advertising by selling ourselves instead of the farmer, his son and daughter and his wife. We talk physics and engineering to the farmer instead of pigs and crop insurance by the use of time-saving mechanical power machinery. We never thought of telling the farmer in ads this spring that with a tractor he could save enough pigs from a dozen or fifteen pure-bred sows to pay for his tractor, and he could allow his boy to finish high school. Nero fiddled while Rome burned. Did we tractor men sit around in the blue fog of our own self-inflicted pessimism and talk cogs and wheels instead of crop insurance when the river bottoms were flooded and rains kept the low and flat farming sections so far behind that they couldn't catch up?

Few of us ever stopped to think that one of the reasons the

farmers stopped buying tractors was because they stopped buying everything when they had nothing to buy with at the time when the deflation cut the value of their crops in less than half 18 to 20 months ago. He pretty nearly stopped buying sugar, and coffee too, if you look into the matter.

The Dealer is a Pioneer

Various reasons can be ascribed to our troubles besides the lack of vision and our inability to see into the future. The dealer is the man who has put over every piece of modern time-saving machinery from the time we began improving it. He came into being as a necessity. On many of the big, progressive farms of the country, the dealer has become known as a regular caller in the installation of new machinery for the last three generations.

Perhaps dealers got poor service from their manufacturers frequently. Some tractors failed both mechanically and financially; yes, and MORALLY, too! Perhaps your dealers at that time felt there was not discount enough to warrant his giving attention to the maintenance of these tractors. And then too, dealers and dealer organizations and tractor manufacturers had become disorganized. The first cut in prices of September, 1920, precipitated this cutting and slashing through which we have been going. The manufacturer of tractors never did raise his price in proportion to the prices for other products during that high time.

The tractor manufacturer was never a war profiteer; he never did go on the theory, as did some manufacturers of other commodities, that "Everybody is getting war profits; let's get ours while the getting is good," but the tractor maker cut and cut his prices and slipped quietly around doing his cutting without any tom-toms heralding it, while other commodity manufacturers were sending out large advertisements and propaganda which secured front page publicity on the leading papers of the day with the announcement of their reduction in prices.

More Unity Needed in Industry

The reason you are meeting here tonight should be for UNITY: Unity of action, unity of thought, unity of progressive and constructive work with a goal towards which you are all aiming. You as individuals cannot fight this battle alone; it has been tried. Eventually you dealers are going to organize effectively because you realize your responsibilities as a class that must give out something instead of each individual asking himself, "What do I get out of it?"

You have problems to solve. If sales talks are needed along progressive lines of selling tractors to farmers in their language of saving pig crops, keeping the boys and girls in high school until they are graduated, shortening the field day and season so that the family can take advantage of the good roads that lead to the city and town pleasures, giving Mother a shorter and happier day in the house so she can get out and step with the family on picnics and social occasions, let's talk them over. If you think that discounts and commissions should be increased to sell more tractors, in order to give more service with those tractors sold so that they will all work from the first and continue to work, talk it over.

If protection from the passage of bad road laws, burdensome taxes and unfair guarantee and so on, are pressing, talk them over in your own organizations. They will get a united voice speaking right so it will be heard.

If you need dealer stimulation, work it out as an organiza-

*Address before the Northwest Tractor Trade Association, Minneapolis, May 29th.

tion. If the factories supplying you are not acquainted with your local situation, take up the matter with them. Service (that much abused term) must be met—only through united organization effort and principle can the solution of this great tractor problem be accomplished. You manufacturers, distributors and brokers should let the dealers know you are fighting their fights too. Let the banker know that the local dealer is to have a profit so that he can cultivate and build up this dealer to the point where he will be glad to finance him. Let the farmer know that the dealer is making money enough to extend a real service to back up every single tractor sold.

Get Cooperation of Colleges

There are the officials of our great agricultural colleges. Now and then, there is one who has been set against the tractor, and an entire department may be out of sympathy with the progressive power farming idea. Instead of inaction and complaint about one such case here and there, appoint a committee in that state to present your case fairly and accurately.

It would be a good idea for our influential men to help these colleges with their state legislatures in getting needed appropriations for buildings, equipment, extension work among the farmers in traveling trouble schools and demonstrations, as well as laboratory and experimentation work. These colleges are real constructive forces in educating the youth of the country to a higher level of engineering knowledge as applied to more progressive farming, and we are making a big mistake if we do not recognize this fact.

The whole business from top to bottom needs organizing, I believe, so that the manufacturer has his finger on the pulse of the farmer through the dealer.

The 1922 Model for 8,000,000 Youth

But, all that is past. Ahead—is the future. We are bringing out THE 1922 MODEL. Are you ready to receive it?

But are YOU the 1922 model to put it across? Can you present it in its true light as the harbinger of a new day for American Agriculture? The modern farmer wants it; needs it. It is the hope of the 8,000,000 farm youth, soon to harness their youthful enthusiasm to the farm that will give them the pleasure out of life that comes from honestly earned profit from toil. The farm girl will stay on the farm if her future will mean a lightened day and a chance for recreation and social life on a par with her city cousin. Their mother doesn't care for the town and city if her children can get the advantages to which they are entitled on the farm.

Are We the 1922 model, ready for the task of taking this wonderful machine and putting it into the hands of the American farmer and his family to solve this problem of a prosperous rural life?

Could you, in the mood you are in now, take an order if it came stalking up to you and demanded to be taken? Have you got yourself in that mood to receive the 1922 model? Have you a feeling of doubt that business will last? Do you dread to meet your dealers again? Do you have a self-conscious feeling that your discount isn't enough? Is there a service for which the dealer asked the last time you saw him that has not been given? Did you threaten some dealers? Did you knock your competitor, either directly or indirectly? Do you have a feeling that right here in this room at this minute, there is competition you would like to eliminate? Are you building up an ethical sales campaign?

Live Stock Men Are "Key Men"

Are you ready to sell the dealer and teach him modern live stock sales talk? Are you teaching your dealer to get acquainted with his immediate territory and watch new farm organization plans like calf and pig clubs, Smith-Hughes high school visual educational work, and the Farm Bureau plans? Can you talk and educate your dealers and salesmen all along the line in crop and live stock prices and their relationship?

Do you know your farmer can get twice as much for his bushel of corn right now by feeding it to hogs as he can by selling it as grain? Have you got wise to the fact that the pure-bred live stock men are "KEY MEN" in every community, being looked up to as leaders who are first to adopt

progressive time-saving methods? Sell them, and you sell a community as fast as it is ready financially to take it up.

Do you know where the dairy cow belongs in your scheme as a monthly cash contribution in your territory, and are you boosting her and pure-bred bulls to produce the same amount of milk from just one-half the number of cows?

Time for Other Things

Do you know time saving by modern mechanical power on the farm permits the farmer to turn this time saving into dairy products and the raising of meat producing animals through pure-bred sires?

Are you progressive or are you selfish? Have you that feeling "Just so I get mine, the rest can look out for themselves?"

No, you don't want to be a one-time order taker who is being hounded by his factory to sell more tractors to keep them in a good mood. The one-time order boys make misrepresentations, extravagant statements, misleading and impossible guarantees, and promises they know they cannot keep.

Constructive Criticisms Needed

Have you told "the boss," or do you fear him because you are afraid he doesn't want to hear unpleasant news? The tractor manufacturers left after the house cleaning of the deflation period are honest, constructive men who have been through the same searching tests as their 1922 models. They want to hear constructive criticism; for they realize that your advice is for their own good.

And the future is opening up a place for the tractor on every progressive farm. Don't worry about the market; there are going to be swamp orders in short time for all the honest manufacturers.

A Follow Up Service That Irons Out the Kinks

SAMPSON ELECTRIC COMPANY
STARTING - LIGHTING - IGNITION

2324 N. LAUREL AVENUE
CHICAGO

TELEPHONE CALUMET 1100

Mr. G. Grinnell,
4574 No. Drake Ave.,
Chicago, Ill.

Dear Sir:-

In keeping with our policy of Service by the Golden Rule, we wish to inquire whether or not the repairs to the Gray & Davis Motor Generator, and wiring on your Ford car, brought in to us some time ago, were entirely satisfactory.

The prevailing opinion regarding service stations, is none too savory, and is, we regret to say, too often based on fact. In servicing your starter, generator or ignition troubles, our interest does not cease with the payment of our bills. If there is anything we have overlooked or any trace of dissatisfaction in your mind as regards our service, please advise us. We want our service to be so different from that offered in the ordinary establishment devoted to ignition, starting, and lighting, that the mere mention of our name will breed confidence in every car-owner's mind.

If our service has pleased you, may we ask that you pass the good word along to your friends? They too might appreciate a square deal in a blind game.

Very truly yours,
SAMPSON ELECTRIC COMPANY

Edw. Simpson
President

PC-SP

SALES - SERVICE

Read the above letter. It's an honest-to-goodness appeal to the customer that rings true because of its frankness. This company realizes the get-the-money attitude has too long been associated with automotive maintenance, and takes this precaution that it shall not be placed in this undesirable class. More of this interest in the customer aside from getting his money will be in vogue as competition becomes more intense. Get a head start now, it's good business.

Selling Is the Dealer's Big Job

Some Interesting Comments on the School in Which the Pioneers Were Trained by a Man Who is Still His Best Salesman

"I SOMETIMES am led to believe that the salesmen of today do not appreciate how much conditions have changed and how much easier time they are having than we had some years ago.

"I recall a picture of along in the early years of 1900. I was in the alley back of my salesroom talking with five farmers who had expressed interest in the two-cylinder car I was then successfully retailing. I had their interest and their eyes were sparkling with anticipation of a fast ride out one of the main streets, when up the alley came one of my 'satisfied' customers, carrying a bursted inner tube. He was hot, dirty, tired and mad. He blurted out:

"You fellows may think you are going to have a good time with one of these cars, but you're not. It's only dirt and trouble."

"That was a stunner. I was about keeled over, but I changed the subject at once to the thrill of riding five times as fast as a horse could pull a carriage, and then wound up with a lecture on the improvements that were being made in tire building. I tried to make that audience believe that the motor car was about perfected, and the only improvement of the future was in the tires, and that rubber was going to be made to behave.

"I may not have succeeded at that moment, but later I sold some of those farmers."

The occasion of this talk was the reminiscence that closed a dealer meeting in Minneapolis. The talk had ranged from future prospects and present ills to the tales of days gone by. Leslie Fawkes was the last man on the floor. He was the oldest dealer present in point of experience. He pioneered the horseless carriage in that section of the country. He also told this story:

"I sold a man a two-cylinder car, and his first month's repair bill was \$160, and he did not believe that we knew what was the matter with the car. Neither did I. He had complained many times, and I had run out of answers, so I said:

"I am sorry, old man, but I do not make these things, I only sell them; but to show we mean well, we will split the bill with you." He replied:

"That's mighty fine of you. You know, I thought I was going to fly around the country almost on wings when I bought that machine; but it's this way: I get it out and tinker around to get started, then get out and get under for an hour and then sometimes I ride an hour." He had said this in a meditative manner, and I had nothing to say, so we sat silent for a few minutes. Then he brightened up and exclaimed:

"But it's worth it!"

"That was all the encouragement I needed. A few minutes later I was selling as hard as ever. Of course, our service practice is different now—as much improved as the cars."

Fawkes has made a success of selling cars in Minnesota, where winters are still a handicap; because in spite of snow removal talk and theory, the motor car is not an all-winter vehicle in most of his territory. The season is short. Fawkes loves his northern country and the motor vehicle, and he has kept pushing ahead in spite of handicaps. You can judge his success by comparing the number of Reo name plates with others wherever cars are parked in his territory. And so it came about that he was asked to tell more of his idea of present-day selling. What follows is in substance what Fawkes passed along for any dealer or salesman who may care to read it:

I enjoy selling more than any other one thing except driving a motor car, and to me selling motor cars is driving them.

The demonstration is the biggest single item in the sale to me.

Years ago when it was necessary for me to sell in order to live, I made demonstrations my big point, and I seldom ever went at it as formally as do the salesmen of today. My trump card was bringing men down to business in the morning, taking them home in the evening or for lunch (in those days nearly all business men went home for lunch).

My wife and myself often picked up women and took them to meet their social engagements and called for them when it was over. If the woman was going home about the time the

husband left the office we would call for him and pick up his wife and take them home together.

It was hard to drag men away from their desks in those days, just as it is today, so I got them before they had put their minds to the business of the day.

Also we made it a point to learn if a prospect had a business engagement at some distance from his office during the day.

We never talked sale to a man or a woman until after an initial ride.

Today, it seems, there is much formality in selling and many ideas of routine, and most salesmen have regular hours, often referred to as banking hours. The



Leslie Fawkes

salesmen I meet have seldom any early morning engagements, nor do they appear to favor the informality that we formerly enjoyed as our best business getters.

It is my belief, too, that a good many of the men who were excellent salesmen a few years ago are getting out of training. Selling is the one big job of the automotive dealer's establishment today. There is not much business of other sort to such an establishment. There is practically no buying, the factory attends to that for you—in some cases too well. Our job is cut out for us, and where we have advanced from salesmen to dealers, we have merely a bigger job.

Golf at \$100 a Game

This job is not only selling ourselves, but teaching others to sell and keeping the cars sold. This is quite a job. A few years ago I learned golf, and I loved the game. I do still, but I have concluded that \$100 a game would be a low estimate of the cost of the games that I have played. I was always hearing of sales lost because I had not been on the job.

I have always been in close touch with my business, and I want to remain so. The purchase of an automobile is usually the biggest transaction the buyer has ever concluded. He wants to be very sure that he is right, and he usually wants

a word with the dealer. I want that word with him, because I want that car to stay sold.

I think that it is well worth while for me to tell this customer that I am glad he bought a car from me and that if he does not find everything exactly right that I will be glad to make it right. I like to step out to the car with him and show him some things about handling it and to point out to him some things that he must do. I like to tell him about our maintenance department and what it is for and how we conduct it. I want him to think that this big transaction of his is appreciated more than his purchase of a cigar.

Also, I like to be on the floor and know exactly how our customers are being handled and what they are told about this car, so that I may know just how much of a job we have in keeping them sold.

The dealer himself should always be the largest factor in his business. I bring more live prospects into this establishment than any other source. I gather them from business associates, men who know that these men can buy such a car as I sell.

Fawkes also has some rather original ideas on the sub-dealer proposition. Some of his thoughts are as follows:

This country has been hit very hard in the matter of dealers

during the last two or three years. When the country dealer could sell cars, we could not get them for him. When we could get them to pass along, he could not sell them. The work this spring has been from a standing start. We have done very well in those communities where dairy money has made the communities prosperous.

Locating a Good Dealer

I have established some very good dealers by sending a salesman to the town selected with several cars, with instructions that he stay there until he sells them. He finds a place to display them, begins looking up prospects, and by the time that he has sold a car or two he has the opportunity of selecting the person he wants for dealer.

Just show that sales can be made, and that other persons in the community are interested in your car, and the dealer problem will take care of itself.

But dealers are human, and they must not be expected to swim alone, just by throwing them in the water. You must be careful not to take on more dealers than you can supply with cars, and you must give this dealer the proper encouragement and assistance in his maintenance work. You must bring him into your organization if you expect him to succeed.

What a Local Dealers' Association Can Do

| | | | | |
|--|--|--|---|---|
| Car Registration Bureau: For Peoria county and adjacent territory This department has address plates of all car owners in this territory subdivided according to make of car Service open to members for circularizing at cost | Employment Service: Applications taken for benefit of members who want help of any kind Service works both ways in aiding employers and applicants | Group and General Meetings Group meetings of each branch of industry held periodically General meetings of all branches (bi-monthly) are held on call of president | Bulletin Service: (Chattels & Liens) Periodical issuance of bulletins giving names of people against whom chattel mortgages and liens have been recorded at County Recorder's office | Better Business Bureau: Operated for stoppage of all fake advertising schemes and providing the truth in advertising. Investigates the soundness of any proposition at instance of a member |
| Interior Department: Committees operating under this department promptly investigate grievances among the members Every effort is made to adjust difficulty and arrive at an amicable understanding | Publicity Bureau: Publicity of general character, showing soundness and enormity of industry emanates from this department | Automotive Exhibits Department: All automotive shows and truck tours are held under the auspices of this department | Credit Information Bureau: Credit information among members compiled under this department | General Information Bureau: If you require certain information and do not know how or where to get it—phone this department Nine out of ten times it can help you. |

THIS is the working outline of a local dealers' association as worked out by F. C. Zillman, secretary-manager of the Illinois Automobile Trade Assn., and the directors of that body. It has been put into effect with the Peoria Automobile Dealers' and Accessories Association and will supply the basis for organization of associations throughout the state. The local secretary will be assisted in keeping his departments active by information and speakers supplied from the state association.

A Ford Mechanical Guide

AMONG the very recent technical book publications is "Ford Car, Truck and Tractor Repair" by Alfred A. Good, formerly director of Ford Motor Car Service School. It is very clearly written in a language that should be understandable to anyone with fundamental knowledge of automobile maintenance.

The first chapter is devoted to the Ford chassis and its component parts and covers an outline of the Ford method of suspension and bracing of the chassis assembly. Very pertinent information re-

garding factory methods of assembling and dimensions of units which heretofore has not been published in book form is included in this chapter. The latter part of the chapter is devoted to a description of the necessary maintenance operations on the chassis units.

There are eighteen chapters and at the end of each chapter is inserted three or four pages of questions and answers that have special reference to the chapter text. Of the 229 pages of reading matter, 33 are devoted to comprehensive data concerning the dimensions, tolerances and repair operations on the Model T engine. The remaining sixteen chapters

cover the following features:

| | |
|---------------------------|-----------------------------|
| Transmission and clutch. | as applied to the Ford car. |
| Rear axle. | Ignition system. |
| Front axle. | Ford generator. |
| Steering gear and brakes. | Starting motor. |
| General lubrication. | Storage battery. |
| General radiation. | Fordson tractor. |
| Automobile fuels. | Fordson carburetion system. |
| Electrical principles | Ford air washer. |

Each chapter is thorough in its treatment of the subject to which it is devoted and is remarkably free from generalities. The book is recommended as an accurate guide and reference to the Ford and general maintenance mechanic. Published by McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

"Shop Profits"

Is a New A. E. A. Merchandising Film

Companion to "Ask 'Em to Buy" Illustrates the Rapid Development of a Mechanic When He Got the Idea of Business

"SHOP PROFITS," a new film by the Merchandising Department of the Automotive Equipment Association, will be shown at the summer meeting of the association. This film is entirely distinct from the "Ask 'Em to Buy" film that was produced last fall and which has been shown to more than 40,000 dealers, but is a suitable companion, as it deals with a business that is closely connected with the merchandising of accessories.

The lesson in this film is the value of an orderly shop, the proper equipment and a proper accounting system. Tom Crawford develops from a good, single handed mechanic into a responsible business man, a just employer, because he knew the value of keeping his word with the customer and immediately saw the value of the flat rate—or selling by the job, when it was proposed to him.

The story of "Shop Profits" is built around an aggressive young garage owner who has developed a good repair business. He does good work and delivers it punctually. He has plenty to do, but is disappointed at the end of each month to find that he has made only a living.

He knows that with a business the size of his, in his location, he should be making a good profit and saving something for a rainy day. After thinking it all over, he decided that if he hired more men and did a greater volume of business he could add appreciably to his profits.

He hired two more men, and succeeded in keeping them fairly busy, but at the end of a couple of months was forced to admit that in spite of these extra men and the additional work that he had done, his bank account was no larger than under the old conditions.

He sits down one afternoon to figure it all out and see if he can discover the difficulty. While he is figuring away he is visited by a salesman from one of the jobbing houses he patronizes. This salesman is an old friend, and asks: "What are you doing? Counting your profits?" "Profits!" says Tom. "No such animal around here."

The salesman is sorry to find Tom so blue about the business and volunteers to help him check things up and, if possible, work out a solution of the problem.

One of the first discoveries they make is that Tom has no record of his expenses, and has no way of figuring out the cost of an hour of labor in his shop. He doesn't know what his overhead costs him and his bank is his trousers pocket. The salesman suggests that Tom employ a bookkeeper. Tom can't see it, but finally agrees to try it out and calls up a friend of his named "Higgins," who is employed as a bookkeeper with another concern. Higgins is interested and comes over to discuss what Tom needs.

Tom and Higgins go over the situation pretty thoroughly and decide that a system can be worked out that will permit

Tom to keep records of the daily transactions that can be entered by Higgins in his spare time in the evenings.

When Tom and the salesman put the shop under the magnifying glass, they discover a number of things that cause them to wonder how Tom made a living, rather than why he didn't make a good profit.

One of the departments of his shop that demanded immediate attention was the stockroom. Tom had very few bins, and the few he had were not labeled, but were filled with a miscellaneous collection of units that made it necessary for a mechanic to search through several bins, or perhaps on the floor, to find the particular part needed. This was responsible for a lot of lost time on the part of the mechanics.

Another big item of expense in Tom's business was tools. He seemed to be continually buying tools. He had no tool room, and when a job was finished the men threw the tools on the bench or on the floor, with the inevitable result that a lot of them were lost and broken.

Tom had a show case, but had been so busy with his shop work that he had neglected it, and the salesman found it back in a corner filled with tools and a miscellaneous collection of old junk. "Tom," he said, "you should clean this up and fill it with a display. You know it helps—'Ask 'Em to Buy.'"

Tom was very much impressed with the things that he had found just by sitting back to take a good look at his own shop, and put his men to work straightening up the stockroom and building a small toolroom.

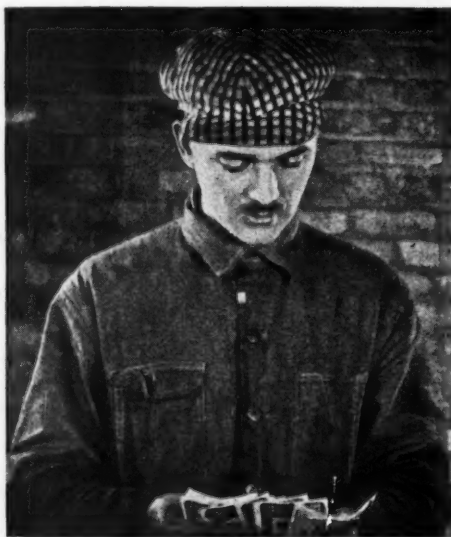
A few nights later Higgins presented Tom with a statement which, among other things, showed that while Tom had paid his mechanics for 4,992 hours of

labor, he had billed his car owners with 4,056 hours, leaving him 936 hours to be charged to shop overhead. This, together with his rent, light, power bills and other expenses, gave Tom an overhead of \$2,167.25, which explained pretty clearly where a lot of the profits were going. Tom was convinced of the value of keeping books.

Another item of expense that Tom found he had badly underrated was the bad accounts. If a customer didn't pay a bill, it simply meant that Tom paid it for him. A few bad accounts showed Tom the value of "Asking 'Em to Pay."

About the time when Tom is wondering whether to enlarge his present building or move into a new one, the salesman drifts back into the picture and takes Tom over to see Dan Morgan, who will be an old friend to the many thousand dealers who saw him put the "Ask 'Em to Buy" idea across so successfully. Dan has applied the job rate system to his business and has done so well with it that Tom decides that the most profitable way of doing business in the shop is to charge by the job, and then have the equipment that will enable him to do the job in the shortest possible time.

The film was produced by The Rothacker Film Mfg. Co., and in addition to its technical value has many interesting features that will appeal to anyone who likes to go to the movies.



This is Tom Crawford, the dealer or garage man or hero or whatever you want to call him, in Shop Profits. He hired more men, worked very hard, but still his "pants pocket bank" failed to house profits



Bob, the jobber's salesman, asked to see Tom's "books," and is informing Tom that in this book many items are "not marked paid"



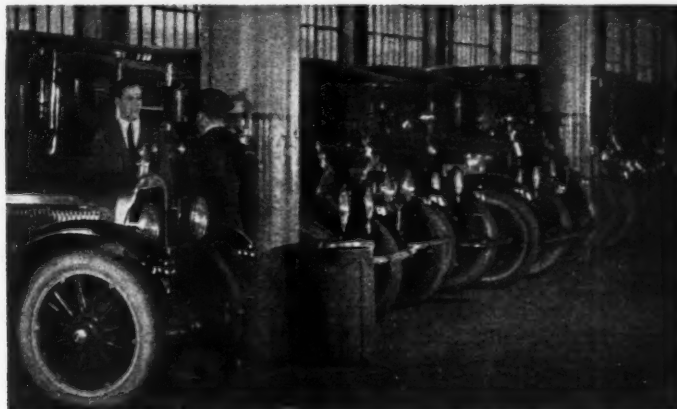
Higgins, a bookkeeper for a neighboring firm, comes in at Tom's invitation and discloses the sad story. In regard to item after item, he informs Tom: "And YOU paid for THAT!" The story of the lost profits



This is the little one-man stockroom after its limited contents were sorted and rearranged on newly built shelves



This is the all-steel stockroom in the new building which Shop Profits built for Tom



Dan Morgan, the hero of "Ask 'Em to Buy" (the other film), loaned his building and machine equipment that Tom might see how real folks run an automotive establishment. Tom is the man in the background, talking with one of his customers



Scene in Tom's eventual establishment, with a mechanic making an automotive equipment sale to a service customer



Tom's customers, in his final establishment, pay cash and beside the cashier's window is a show case which does profitable duty as an "Ask 'Em to Buy" aid

An Engineer's View of the Importance of Maintenance

There Is a Two-fold Responsibility—That of Keeping the Transportation Unit Moving and of Reporting to the Manufacturer the Defects in Design and Production

By O. E. HUNT*

Chief Engineer of the Chevrolet Motor Co.

YOU will all agree, I am sure, that the major purpose of such gatherings as this is to give those who attend an opportunity to get a broader view of the business problem on which they are engaged. Daily contact with business routine is not a very broadening experience.

With this in mind, let's consider the service problem, not from the standpoint of how you are going to handle the individual dealer or owner, nor from the viewpoint of any individual manufacturer. Let's consider the responsibility of the service to the industry as a whole. I believe we can get the best picture of the situation by viewing it from the present position of the industry with relation to its public.

Car Buying in the Early Days

In the early days of the industry the purchase of an automobile was a sporting proposition—a long chance, but after he had made his purchase the owner was not through taking chances. He took an equal chance whenever he started on a trip with his car. He usually had to be his own service man, as far as the adjustment and installation of parts were concerned, and his repair station a roadside or convenient blacksmith shop.

As cars increased in dependability, we passed into the "joy riding" stage of the industry's development, during which time the majority of the users were pleasure seekers, and passenger carrying pleasure vehicles acquired the name of "cars." During this period the industry made a big start toward assisting the owners in keeping their cars in operation, but it was not until the public generally came to look upon automobile transportation as a necessary part of their business, as well as their social life, a change that progressed most rapidly during the war, that we developed the present owner attitude toward assistance from the seller in keeping his car in operation.

The automobile buyer of today does not want to buy a "pleasure car" or merely a personal transportation unit; he wants to buy and expects to get transportation service. He of course expects the comfort, convenience, and good appearance that have come to be the usual thing in all automobile design, but the principal things that he is interested in are continuity of the service, the cost per mile of the service, and the character of business treatment that he receives, both in the initial purchase of the unit and in such subsequent business transactions as are necessary to insure continuity of its usefulness.

I think it is perfectly obvious why he should place continuity of service first. He has come to think of his automobile as a time saver and space destroyer in connection with his daily business. If he loses the use of it for several days, for any reason, he is greatly handicapped; he is unable to do the amount of business that he had expected and planned to do. Continuity of service is, of course, dependent upon the

stability of the original design and upon the ability of the owner to immediately obtain repair parts and intelligent labor for their installation, whenever they may be needed.

The Three Divisions

The cost per mile falls under three major divisions—capital cost; operating cost; maintenance costs. Operating costs are largely a question of car design, though influenced to some extent by owner treatment. Capital costs, being tied up as they are to the first cost, depend upon the design and efficiency with which the unit was manufactured.

The maintenance costs reflect not only design and the care taken in manufacture, since these determine the mileage the car will give before maintenance attention is necessary, but also the cost of maintenance parts and the labor expense of replacements. The cost of maintenance parts is determined by design of the parts, the efficiency of the organization that produced them, and the expense involved in their distribution. The labor cost of replacements is controlled by accessibility, and the efficiency shown by the service organization in handling the work.

In the matter of business treatment, each buyer, of course, prefers to purchase from an organization that has a uniform price and business treatment policy. In his further dealings with the company, in connection with car maintenance, he wants the same sort of treatment. He wants pleasant treatment, of course, but more than anything else he wants to feel that the organization he is dealing with appreciates that his greatest interest is continuity of service, and he is going to feel that he got proper treatment only when he sees the service organization making a sincere effort to give him such service.

It seems clear, then, that in these days of selling transportation service, the service organization, controlling as it does important elements of continuity of service and cost of maintenance, and being the sole point of contact with the customer on such points, after the sale is made, has a tremendously important function to perform in developing and maintaining owner good will; a function at least equally as important as the selling function.

Aside from acting as the channel through which assistance passes from the seller to the owner, service has an almost equally important function in carrying from the owner to the seller a correct picture of the average owner attitude toward the product, together with all his suggestions looking to its betterment.

Service Troubles Once Unheeded

The automobile business is at least developing into a highly competitive business. Under conditions of competition the producer who makes the greatest success in any price class is going to be that producer who gets a reputation with the public for giving the best result per dollar invested in transportation service. The owner is the final judge, and so his opinion is of vital interest to the producer. The manufacturer wants from the service organization not only an accurate picture of this owner opinion, but also accurate information as to the causes of such failures, as may develop in service.

In the days of the rapid expansion of the industry, manufacturers were so busy trying to catch up with demand that

Mr. Hunt was one of the invited speakers at the recent meeting of the Service Managers' Committee. His talk was one calculated to broaden the vision of maintenance.

they did not give the attention that they should to service complaints. They seemed to feel that commercially they were relatively unimportant, since the demand exceeded the supply in spite of chronic failures of certain parts and the continuation of petty annoyances. During this period service men were compelled to exaggerate their troubles in order to get any attention to them. This was very unfortunate as plans for design improvement have to be based on facts and not on exaggeration or opinion.

The service branch of the business can do the manufacturer and engineer a wonderful service if they will only appreciate that they are operating a nation-wide road test of the company's product; and that they are in a position to get a broader picture of the facts about its performance and the satisfaction of the owner with that performance than any other

branch of the business. They should develop means of collecting these facts and keeping them from getting contaminated by exaggeration or opinion during their transmission to the manufacturer, who, in these days of competition must strive to give his owners the very best transportation service result possible per dollar invested, and is consequently vitally interested in the owner's experience, and in his suggestions for improving the result.

Service, then, viewed from the standpoint of the industry as a whole, has the important responsibility of assisting the owner to get from the industry the greatest possible continuity of service at moderate cost, and to get for the manufacturer from the owners who are operating the nation-wide road test, the best possible picture of the actual results they obtain.

Rolland-Pilains 122 Cu. In. Race Cars Ready

FIRST of the new French 122 cu. in. racing cars to get on the road are the Rolland-Pilains, built at Tours. These cars had been intended to start in the Indianapolis 500-mile race, but owing to delays at the factory they could not be completed in time.

The Rolland-Pilain engines have eight cylinders in one aluminum casting, with a thin steel liner. Dimensions are 59 by 90 mm. bore and stroke. Two valves per cylinder only are used and are mounted in the head, the angle between them being 160 deg. There is a separate camshaft for each line of valves, with front end drive by gears.

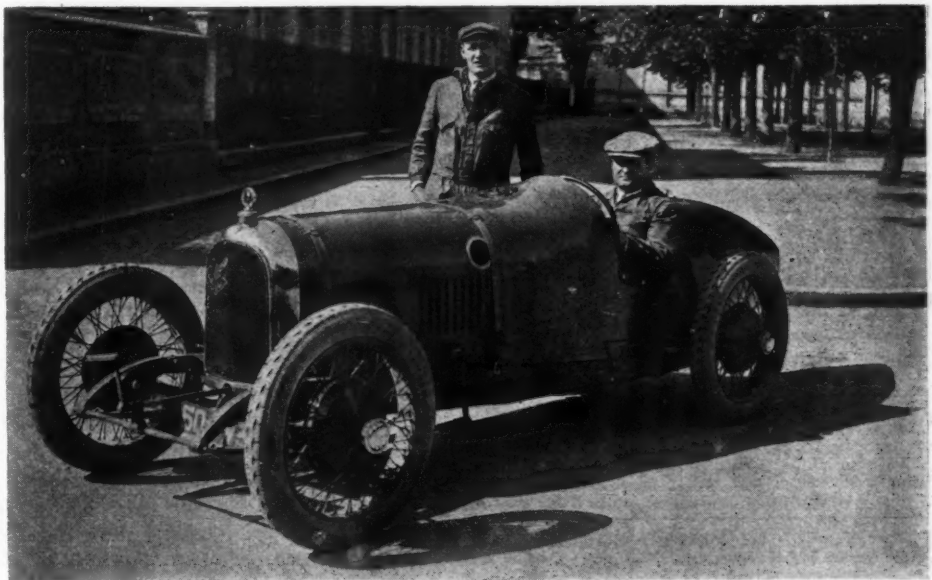
A single spark plug is mounted in the head and receives its current from a Delco generator. Ball bearings are used for the crankshaft, camshafts and timing gear, and roller bearings for the connecting rods. By the use of magnesium, the weight of the pistons has been got down to 100 grammes, compared with 210 grammes for pistons of similar design in aluminum. The wrist pin floats in the piston.

Experiments have been carried out with a mechanism for positively closing the valves by cam action. At present both this system and the normal system of closing by springs are prepared, for two separate sets of cylinder heads have been constructed, and it will depend on the tests which type is finally retained.

The engine is a unit construction with the gearbox, this latter providing four speeds ahead and reverse. Drive is transmitted through the springs, with torque reaction provided for through the gearbox; there is thus a single universal joint. The clutch is of the plate type.

In the chassis layout the features are the underslinging of the front axle and the underslinging of both the axle and the frame at the rear. This gives the car a general slope rearwards and keeps center of gravity down very low.

As the French Grand Prix race is run on a course only eight miles round, it has been decided to abandon the use of a spare wheel. This has enabled the body lines to be refined and has tended somewhat towards a reduction of weight. With a track of 47 in. in front and 43 in. at the rear, and a wheelbase of 110 in., the total weight of the car is 1,455 lbs. This is 66 lbs. above the minimum im-



Eight-cylinder Rolland-Pilain 122 cu. in. racer. Frame and axle are underslung at rear

posed under the French racing rules. The Rolland-Pilain cars are fitted with hydraulically operated front wheel brakes and hand operated rear wheel brakes. The brake drums are in the axis of the

wheels and steering pivots are straight. Drivers of these cars in the European races will be Albert Guyot, Victor Hemery, Louis Wagner and the aviator Sadi-Lecointe.

Final Standing of Indianapolis 500-Mile Race

THE final check of the results of the 500-mile Indianapolis race shows that thirteen cars officially finished the race; that is, covered the entire distance.

Following is the standing of the thirteen cars:

| Position | Car—Driver | Time | M.P.H. |
|----------|-------------------------------|---------|--------|
| 1— | Murphy Special—Murphy | 5.17:30 | 94.48 |
| 2— | Duesenberg Special—Hartz | 5.20:44 | 93.53 |
| 3— | Ballot Special—Hearne | 5.22:28 | 93.04 |
| 4— | Duesenberg Special—DePalma | 5.31:04 | 90.61 |
| 5— | Duesenberg Special—Haibe | 5.31:13 | 90.58 |
| 6— | Duesenberg Special—Wonderlich | 5.37:52 | 88.79 |
| 7— | Duesenberg Special—Fetterman | 5.40:55 | 87.99 |
| 8— | Distel Duesenberg—Vail | 5.48:19 | 86.15 |
| 9— | Monroe Special—Alley | 5.55:53 | 84.20 |
| 10— | Duesenberg Special—Thomas | 6.03:24 | 82.50 |
| 11— | Frontenac Special—Baker | 6.18:28 | 79.25 |
| 12— | Durant Special—Durant | 6.25:33 | 77.75 |
| 13— | Bently Special—Hawkes | 6.40:25 | 74.90 |

From the miles per hour column it will be noticed that the time of the Bently Special was 74.90. In 1911 the average miles per hour of the winner was 74.48 and this was made with a car in the 600 cu. in. class.

MOTOR AGE

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Can You Afford to Be Without— An Orderly Parts Stock?

EVERY dealer who does any amount of maintenance work on cars, trucks or tractors usually has some sort of parts stock. Sometimes this stock is neatly arranged in bins or boxes, all properly labeled or marked for identification of the part contained therein.

Unless the stock room is quite large, there is very often the likelihood that things will not be kept according to a well defined plan. Some of the smaller establishments seem to content themselves with the mere building of a few shelves with partitions and then crowding these full of parts that have little in common with each other. You may find a bin with clutch parts and axle parts in it. There may be another with generator gears and rear axle pinions, and so on. Small parts often are scattered about the large parts. Result: It is difficult to find any part quickly, and the chances of taking a good inventory are remote.

No matter how small the parts stock may be, the first requirement is orderliness. In one instance a dealer had secured some 300 lidless cigar boxes of the same size, fitted the boxes with brass handles and labels. A wood framework was then put up and the boxes placed therein in much the same manner as the drawers of a desk. This arrangement made for neatness, the parts

were kept practically dustless and the whole system allowed of finding any part with dispatch. Such boxes can contain fairly large parts. This dealer met the requirements of a well conducted stockroom pretty well, and the chances are when his business expands he will put in some sort of steel sectional bins to which he can add from time to time.

In a parts department where there is no system, only the attendants know where certain parts are kept, and even they may at times have to guess at it. Where there is system and an orderly arrangement of the parts in bins or boxes, anyone in the establishment can find any parts by reference to the card index. But the card index can only come after the parts have first been carefully placed away in labeled bins.

Optimists

WE WOULD like to enter in the loving cup contest for optimists (if one is organized) the factory salesmanagers, the distributors or whoever it is names the local dealers for automobiles, trucks, tractors and other vehicles.

Recently there was named as a dealer for a highly thought of car a man who already has failed in the sale of six equally good cars. The complaint against this man is that he does not know the fundamentals of business, and that while he may sell some cars one season, he does not save enough of the money he should make on these cars to keep himself in business over winter. He may sell some cars one season and not be able to service them later.

His latest appointment was made without any special education on the part of the man who appointed him. One of the first things this man did was to ask MOTOR AGE how to equip a maintenance station. He does not subscribe to our magazine, and wanted the information by mail. Probably he is one of those persons who does not have time to read business papers. One of the first sales of this new car that this man put over was accomplished by bidding a used car up \$300 over the best previous offer. It happens in this case that the owner of the old car had already sold the car, and to accept this high offer he had to give the man he had sold it to \$50 to break the contract.

Another situation is this: A distributor recently said that his greatest difficulty was in getting small city dealers who knew anything about bank loans, bookkeeping, necessity of profit in all departments and other business fundamentals. This distributor has made no effort to organize a course of instruction for his new dealers. He takes a chance with them.

So we say, we believe that men who name dealers under such circumstances and expect them to be profitable dealers, should be entered for any and all optimist prizes.

Ideals

TO THE calculating and very realistic body of men who are engaged in the maintenance of automotive products, the mention of the word Ideals will invariably bring forth a torrent of levity and sarcasm. Strictly speaking the automobile business is no place for potential ideas and dreaming, but taking the word in its broadest sense, it is not difficult to show the most matter of fact person the influence of ideals on the business which provides his livelihood. The whole scheme of existence is built on Ideals. In the brains of the early pioneers of automobile construction, there existed ideals of a system of transportation that would by its superior performance practically supplant the horse. Knowledge allied with common sense ideals brought about the great improvements that are now a part of the modern automobile.

Having an ideal provides the goal towards which all endeavor is directed. Ideals consist in knowing where to go, and knowing where to go is half of the battle of getting there. The flight of birds provided an ideal to the Wright brothers; by keeping that ideal always in mind they were instrumental in materializing the ideal into the newest and fastest form of transportation. If we can admit then that ideals have a place in minds that are creative and not poetically dreamy, why can't we apply the same system of thought to the task in hand.

If the materialization of the designers' and builders' ideals have resulted in an automobile that is vastly superior to previous forms of locomotion, it would seem that there is already prepared by the builders an ideal or goal for the men who maintain these products. To come near that ideal which was inculcated in the car by the builder, requires that the facilities for maintenance follow as closely as practical the facilities that were utilized in the building of the car. Those facilities comprise machinery equipment and human equipment.

It is not always possible to approach within striking distance the ideal in machinery equipment, but it is possible to set a standard of performance of the human equipment that will equal and sometimes surpass the standards followed in the factory. Good work cannot be accomplished without good workmen, but the best efforts of the workmen must be safeguarded by inspection that is thorough. It is in the matter of inspection that most of the modern examples of automobile maintenance stations have deviated from factory practice.

Where finished and accurate units are manufactured there will always be found a department devoted to inspection. Next to the factory that builds watches, or other small intricate machinery, the high grade automobile factory has more inspection work than any other project of like dimensions. The inspectors in the factory are there as part of the equipment necessary to maintain an ideal. The same holds true of methods and machinery. If the man conducting the institution that sells service will keep before him some definite ideal of performance of his organization and strive to maintain that ideal, he will at worst have traversed some ground towards improvement.

The function of technical periodicals in a sense is to show actual examples of advancements which are no more than common sense ideals which have been achieved by some leader in that particular field. Whether they be fostered by printed matter or verbally, the setting up of ideal in any branch of endeavor is simply setting up a standard of value by which all effort can be measured.



The Trouble Twins

RECENTLY a tractor manufacturer in an address on maintenance of the tractor referred to "The trouble twins, oils and operators."

There is no particular reason why he should confine this happy expression to tractors, as it will do just as well for the rest of the list of automotive vehicles. There is not the slightest question as to how much trouble the operator of the passenger car has caused by assuming that because he, or some other person, is a good driver that one or both know all about cars.

There is a big job before dealers of all kinds, as there is an acute necessity of educating the operator of an automotive vehicle to his own ignorance of cars in general and his own car in particular. At present this problem is especially acute because of the considerable amount of piston trouble. It appears to be becoming quite a habit for an owner to buy some oversized pistons and put them in himself. Then he blames some dealer for his troubles.

The question of oils also is especially important at this time, in its large phase, which is better expressed by the word lubrication. The owner can cause a lot of trouble by doing anything else than putting the proper grade of lubricant in the place where it belongs. Most owners will not do even this, but after trouble begins he tries to do a lot of things he does not know how.

This is the time when every automotive man who meets the public should do his best to educate owners to leave things alone and patronize only reliable maintenance institutions.



Laborer Is Worthy of His Hire

WE HAVE all seen the repair shop or electrical station that had a reputation for bleeding its victims, getting them once and getting them right. We are also thankful for the fact that the majority of electrical stations are operating on the basis of value given for money paid, but what is to be said of the conscientious man who often says, when completing a job that takes but a few moments: "Oh, that's all right this time," and in many cases the customer is merely a transient and never shows up again.

In making a check on the time of one man who was starting a small electrical shop, it was found that he worked hard for eight hours. At the end of the day he had collected for three one-hour jobs. The rest of the tasks had each taken but a few minutes, and he had passed them by without collecting, thus working a hardship to himself, and helping to instil in his customer the bad habit of seeking something for nothing.

While each man must be the judge of the exact way of handling his own business, it is evident that we must steer between the extremes of working for nothing and of charging excessively and out of all proportion to the value of the work done.



Why a State Association

THE directors of the Illinois Automotive Trade Association recently discussed for some time what this association had to offer a prospective member. Of course there was legislative interest, but this was considered rather an intangible item to offer in direct return for a money consideration. The same was true of the general elevation of the trade by means of bringing about a better standard of business.

Both of these assumptions probably are correct, and it is more or less a reflection on the dealers generally that they are correct. It should not be true, if the dealer would look back a few years and realize how many invasions of his field have been made by the tax collector. Then he should list the narrow escapes that he has experienced, and he should remember that some one represented him in the fight against the bills that would have taken more of his money.

In Illinois last year the bill to tax gasoline was defeated by virtue of the case made before the proper committee by the Illinois Automotive Trade Association, and the same is true in other states. This one accomplishment is well worth a year's dues to any automobile dealer.

There is no question but that the tax collector has his eye on the automotive vehicle, and it will require constant effort in every state as well as nationally to keep away additional taxes. And every tax on an automotive vehicle is a sales restraint that the dealer must overcome. State organizations should have a very distinctive place in the automotive scheme.

May Greatest Production Month

Output of 252,000 Cars and Trucks Largest in History

Exceeds Highest Previous Record for One Month by 32,000—Schedules Maintained

NEW YORK, June 12—Even the leading factors in the production of automobiles have been astounded at the aggregate output of 252,000 passenger cars and trucks in May, which exceeded the highest previous mark by 32,000. This total may be enlarged when complete figures are available. All factories have swung into June at full speed and are forcing production to keep pace with demand. It has been impossible to accumulate reserve stocks of passenger cars.

Although the industry naturally is gratified that it is operating at capacity, the pace is so swift that it has resulted in many manufacturing problems which would not have become important with a somewhat smaller output. These various factors, none of which is particularly serious in itself, have combined to increase costs considerably.

Parts Prices Stronger

Stock chasers, shipments of parts by express, orders by telegraph and premiums for raw materials, all cost money and add to the expense of turning out motor vehicles on which the profit is much smaller than it was before the era of keen competition forced by business depression. Prices of parts are somewhat stronger because the parts manufacturer, lacking long term commitments, has to buy in comparatively small quantities and pay stiffer prices than otherwise would be required.

Many automobiles are being shipped from Detroit lacking minor parts. When the parts are received at the factories from the makers, they are shipped by express to distributors and the cars are equipped in the service stations of dealers and distributors. By resorting to this plan, shipping delays have been cut down.

While the cumulative effect undoubtedly has been to increase production costs, it has had a stabilizing effect on retail prices and few revisions are in prospect except perhaps in the truck field, where the return to normal conditions has not been completed. While there is no likelihood of further recessions in passenger car prices, it is equally unlikely that there will be any general increases. Whatever upward trend may become apparent will be caused by the necessity of returning a profit in the face of mounting manufacturing costs.

The most popular topic of discussion within the industry is the outlook for the remainder of the year. It is not to

be denied that it is exceedingly bright at this time. There is not the slightest sign of a falling off in demand for June and it promises to be one of the big months of the years.

While it is the general expectation that July will bring a slowing up in sales, the volume of business will depend largely upon the farm market. There is every reason to believe there will be a heavy demand in the agricultural districts as soon as the harvest is well under way, which will be not later than July 15 in most sections.

Bill for Automobile Rural Mail Routes Delayed Again

Washington, June 6—Objection from Congressman Hull, of Iowa, prevented the passage of the bill in the House today for the establishment of motor vehicle rural routes under the direction of the Postoffice Department. The bill provided that the Postmaster General should be authorized to establish motor vehicle routes in rural districts of not less than 36 miles nor more than 75 miles in length. The carriers serving such routes would be obliged to furnish and maintain their own motor vehicles and they would receive compensation of not less than \$2,160 and not more than \$2,600 per year, based upon the length of the route. Compensation would be substantially the same per mile as it is now.

Chairman Steenerson of the House Postoffice Committee stated that it was a departmental bill and the committee was unanimously of the opinion that efficient mailing service could be rendered with motor equipment covering this distance. The bill may be called up again on the calendar at an early date.

JEWETT ROADSTER, \$1065

Detroit, June 13—The Jewett roadster, which is the latest addition to the Jewett line, will start production about July 1. It has a single straight seat, wide enough for three passengers and is featured by a large baggage compartment in the rear, and by curtains which open and close with the doors, to give good vision and a weathertight fit. The upholstery, as in the phaeton, is of genuine cowhide. The roadster is mounted on a standard Jewett chassis.

CHAIN COMPANY SUIT DISMISSED

Cleveland, June 12.—Judge D. C. Westenhaver has handed down a decision in the Federal district court dismissing the complaint in the suit brought by the American Chain Co. against the Cox Brass Mfg. Co. of Albany, N. Y., alleging infringement of the Pancoast and Grotenhuis bumper patent No. 1,374,893.

The chain company announced that an appeal would be carried as rapidly as possible to the United States Circuit Court of Appeals at Cincinnati.

Prosperity Just Around the Corner, Says H. H. Rice

Cadillac President Believes Automobile Industry is Leading the Way to Better Times

DETROIT, June 12—"Over-optimism is to be avoided in business these days when the return of prosperity is in sight," is the key-note of a statement regarding business conditions issued at the request of members of the press by H. H. Rice, president and general manager of the Cadillac Motor Car Co. The statement follows:

"Although the sale of Cadillac cars this year has exceeded all previous records, and, while indications are that 1922 will considerably exceed any previous year for Cadillac, we do not overlook the fact that business is still rather spotty and that there are many parts of the country which are not yet back into their stride.

"However, it is true that every time business depression has hit the country in the past twenty years, the automobile industry has been the last to suffer from it and the first large industry to come back. If the same holds true at this time, and I think it does, the present boom in the automobile industry may be taken as an indication that general prosperity is around the corner.

"Almost every year there has been somewhat of a lull during the summer in the automobile industry and many other lines of business. So it is reasonable to expect that this lull cannot be avoided during the coming summer months, although it is likely there may be a good summer business.

"The automobile industry is striving harder than ever before to give the public the utmost value, and it is a pleasure indeed for those connected with the industry to realize that the present demand for automobiles is a harbinger of returning general good business."



H. H. Rice

VICTORY BONDS EXCHANGEABLE

Washington, June 13.—The 4% per cent Victory bonds due next May will be accepted at part in exchange for a limited amount of a new issue of 4% per cent three and one-half year United States notes, according to an announcement just made by the U. S. Treasury Department.

Some June Schedules Exceed May

N. A. C. C. Directors Alarmed By Discriminatory Laws

**Believe Time Has Come for Dealer
Associations to Put Forth
Vigorous Protest**

NEW YORK, June 10—The astounding production of passenger cars and trucks in May was the subject uppermost in the minds of the directors of the National Automobile Chamber of Commerce at their meeting here this week. The total ran far ahead of the most sanguine expectations.

While naturally gratified at the remarkable business they are enjoying, announcement of the total for May had something of a sobering effect. It was felt that the industry could not continue indefinitely to operate at top speed and that some decline in sales is inevitable before long.

Reports from all sections of the country indicate, however, that there are as yet no signs of slowing up. Practically the only weak spots in the country are Maine and Georgia and it was reported that sales in Maine were 50 per cent better than in April. Several states report sales 100 per cent better than a year ago. Included in this list were Michigan, Iowa, Nebraska and Virginia.

Dealers generally report that June prospects are bright. This applies not only to passenger cars but trucks. May sales of trucks were larger than in April.

One significant fact reported was that the number of sales made on time is decreasing and that there was more cash business in May. The directors nevertheless gave considerable attention to the financing of time sales and it was the general opinion that manufacturers must do more to assist their dealers in this respect in the future than they have in the past.

There has been a marked improvement in the trading situation and the used car market, is growing steadily better.

Exports are increasing steadily. Foreign sales of passenger cars in April were 49 per cent more than in March and sales of trucks were 44 per cent greater.

The directors expressed frank alarm because of what they considered unjust motor vehicle regulations proposed in various states. They felt that the time has come for dealer associations to make vigorous representation to their state legislatures against discriminatory laws.

The following directors, whose terms had expired, were re-elected: Roy D. Chapin (Hudson), C. C. Hanch (Lexington), J. Walter Drake (Hupp), H. H. Rice (Cadillac), and John N. Willys (Willys-Overland).

At the subsequent organization meeting of the directors, Col. Charles Clif-

ton was unanimously re-elected for another term as president. Other officers elected were: vice-president, Roy D. Chapin; second vice-president for passenger car division, C. C. Hanch; second vice-president for motor truck division, Windsor T. White; secretary—A. J. Brosseau; treasurer, H. H. Rice; general manager, Alfred Reeves.

Accessory Manufacturers Form Advertising Council

New York, June 13—Directors of the Motor and Accessory Manufacturers' Assn., at a meeting here, approved the organization of an advertising managers' council. One hundred companies which are members of the organization expressed a desire for the formation of such a division and pledged the interest of their advertising managers. The first meeting of the council will be held in connection with the annual credit convention which will be held Sept. 13, 14 and 15.

The executive committee of the advertising managers council will be headed by E. W. Clark, of the Clark Equipment Co., Buchanan, Mich. The other members are S. E. Baldwin, advertising manager of the Willard Storage Battery Co., Cleveland; J. C. McQuiston, department of publicity of the Westinghouse Electric & Mfg. Co.; Joseph S. Jacobs, advertising manager of the American Hammered Piston Ring Co. and M. Lincoln Schuster, manager of the educational department of the M. A. M. A. as secretary. The council will function through the educational department.

FORD GETS NEW ORLEANS PLANT

Detroit, June 10—Ford Motor Co. has closed a deal for 10 acres of land on the Mississippi River on the outskirts of New Orleans, where will be erected an assembly plant which will build 150 cars daily. The plan will serve the southern half of Louisiana, Texas, and a part of Mississippi. It is later planned to develop the plant to take care of shipments to Mexico and some South American countries.

APPROVE MIDWEST PLAN

Indianapolis, June 12—A reorganization committee has approved the plan under which the Mid-West Engine Corp. will be organized to acquire the assets of the Mid-West Engine Co. of Delaware and the Mid-West Engine Co. of Indiana. The new company will have a capital of \$5,000,000 in 7 per cent preferred stock, 125,000 shares of no par value common and \$2,000,000 in 7 per cent 15 year mortgage bonds.

The receivers for the company appointed by Judge Carter, of Indianapolis, are Frederick Van Nuys and O. E. Stevens. They were appointed upon petition of President J. C. Wood in accordance with the reorganization plan.

General Motors Units Plan Increase in Production

**Early Orders for Parts Indicate That
July Will Show Only Slight
Reduction**

DETROIT, June 12.—Production in the General Motors units in June will show slight increase over May production. Cadillac has scheduled 3,000 cars, Buick is on a schedule of about 400 daily, Oldsmobile will build 500 more than in May, Oakland is building over 100 daily, and Chevrolet is working on a schedule of approximately 1,100 daily.

Dort is building 80 to 90 cars daily, with a large percentage of its business in enclosed cars. The soft top closed vehicles are reported by the factory to be in large demand. Saxon in its new plant at Ypsilanti is building about ten daily and is steadily opening up new distribution territory.

Parts makers report commitments for July to date to be approximately at the rate of 50 per cent those for June, but declare this to be no augury of the actual business that will develop before the month closes. Since the first of the year early parts commitments have been found to be about half the actual requirements of manufacturers by the time the commitment period opened.

Some factories are shipping cars semi-complete and are sending on the parts necessary to complete them by express to save delay in getting the cars into the hands of dealers.

SKILLED LABOR SHORTAGE

Pittsburgh, June 12.—As an indication of the present shortage of skilled labor, the Standard Motor Car Co. reports that newspapers in several cities which were requested to run advertisements calling for high class workmen who specialize in automobile body and engine work declined the copy on the ground that manufacturers in their own towns were so severely pressed for workers that it would be against the best interests of their city to run the advertising and manifestly unfair to local industry. The Standard company is working overtime in an attempt to meet the demand for its line.

ENJOIN BREAKER PLATE SALE

New York, June 12.—Judge Hough, in the Federal district court, with the consent of the Packard Ignition & Electric Co., Inc., defendants in a suit instituted by the Connecticut Telephone & Electric Co., Inc., granted the plaintiff a perpetual injunction restraining the defendant corporation from further selling Breaker plate. It was contended in the complaint originally filed by the plaintiff that the sale of this material by the plaintiff was an infringement on the patent.

Farm Tractors Selling; Outlook for Fall Plowing Good

Greater Speed Required for Preparing Soil for Crops; Improvement Is General

CHICAGO, June 12.—Farm tractors are selling. Manufacturers in the Chicago district, serving the great agricultural sections of the Mississippi valley and the West, whose products were so little wanted throughout 1921 that their business was mostly a blank, are seeing their goods move gradually into the hands of users and the cautiously optimistic say the midsummer and fall plowing and planting season will bring a genuine demand for tractors.

Whether or not this condition develops depends very largely upon this season's crops. If the crops are bountiful, as it now appears they will be, and the prices are adequate, the farmers will have money to spend in replenishing their sadly neglected stocks of farm equipment. The wheat harvest will be on in the southwest very soon and as it moves up into Kansas and Nebraska, the barometer of farm buying for the next few months will be largely determined.

But enough tractors are being sold now to give the manufacturers considerable confidence. Manufacturers reporting to the National Association of Farm Equipment Manufacturers state that in most cases their production and sales are now from 50 to 60 per cent of normal. Summarizing the reports received, the association says:

"Improvement is noted in the sale of tractors and threshers, the backward season having reacted to the benefit of the tractor manufacturer because of the necessity on the part of the farmer for greater speed in preparing the soil for crops. Tractor stocks are moving out of the hands of dealers and jobbers and several factories are now shipping direct. Collections are reported better and an improved business tone generally noted."

From manufacturers themselves comes the story of rapid increase in business, due to some extent to the lateness of the spring. It rained throughout March, a good part of April and when seasonable weather finally arrived there was need for haste in planting and sowing crops. The tractor furnished the means.

At the same time substantial price reductions, following the lead of Fordson, gave the farmer added impetus for buying. The International Harvester Co., by cutting the price and giving a plow free with each tractor, succeeded in disposing of a large stock of machines manufactured months ago. This company's factory production for the next few months is practically all sold, according to officials. One of the company's dealers in California sold 82 tractors this spring and 81 of these were of the type with which a free plow was given.

Advance-Rumely Co. reports that in units sold, its business for the first four

months of this year exceeded the corresponding period of last year by 45 per cent.

Hart-Parr Co., of Charles City, Iowa, writes that tractor sales have shown "wonderful improvement" since May 1. This company also notes that a number of strong dealers are taking on tractor lines, apparently having faith in the rapid improvement of this business.

The Avery Co., of Peoria, Ill., have been conducting an aggressive sales campaign by cooperating with its dealers in holding "Avery Weeks." On these occasions factory representatives are present and efforts are made to get as many farmers as possible to inspect and see demonstrations of the company's tractors. Such weeks have been held at Wichita, Kan.; Sidney, Neb.; Great Bend, Kan.; Enid, Okla.; Bucklin, Kan.; Salina, Kan.; Jetmore, Kan.; and Trenton, Mo.

Summing up the results of these special efforts the company states that "Buying has begun." During Avery week at Great Bend, Kan., 10 tractors were sold. Some sales were reported from each of the other efforts.

Guy H. Hall, director of the National Institute for Progressive Farming, stated that from all reports reaching his office the outlook for tractor sales is very optimistic. He said that when the fall demand comes there is likely to be a shortage of tractors because of the reduced manufacturing schedules.

Business Increased 500 Per Cent by Some Dealers

CHICAGO, June 10 — In the ten months of the Ask 'Em to Buy campaign of the Merchandising Department of the Automotive Equipment Assn., 571 meetings have been held in various cities, attended by approximately 44,000 people. Reports received by Ray W. Sherman, Merchandising Director, show that these meetings have caused a number of known dealers to increase their business by from 100 to 500 per cent.

"ASK 'EM TO BUY" IN MICHIGAN

Detroit, June 7.—Beginning this week the Michigan Automotive Trade Association is presenting the "Ask-'Em-to-Buy" film of the Automotive Equipment Assn. in all cities in which it has a local association. The first showing of the film was at Ann Arbor on Wednesday, with W. D. Edenburn, manager of the state association giving the lecture accompanying the film.

Other cities in which the film is booked for presentation are as follows: Lansing, June 9; Grand Rapids, June 14; Muskegon, June 15; Battle Creek, June 16; Saginaw, June 20; Bay City, June 21; Flint, June 22; Port Huron, June 23; Kalamazoo and Benton Harbor, the first week in July on dates to be announced later.

Elizabeth, N. J., Plant of Willys Corp. Sold to Durant

Maker of New Star Car Forced to Pay \$5,525,000 After Spirited Bidding

NEW YORK, June 12.—Durant Motors, Inc., bid in the huge plant of the Willys Corp., at Elizabeth, N. J., for \$5,525,000 when it was offered at receiver's sale last Friday. James Smith, Jr., representing Walter P. Chrysler and the Maxwell Motor Corp., dropped out at \$5,500,000.

Dramatic scenes attended the auction, which had been expected to be a perfunctory affair. Durant had announced previously that he would not bid a nickel more than he had previously offered the receivers for the property, which was approximately \$3,000,000, and it had been expected there would be no other bidders.

Before the sale opened, however, certified checks for \$200,000, a prerequisite to making bids, had been filed by Joseph P. Day, a New York real estate expert, representing Durant, by Smith and by J. Clarence Davies, a New York auctioneer, who declared he represented no one but himself. Davies dropped out at \$4,000,000.

If the sale is confirmed by the court, the property will be used by Durant for assembling the new line of Star cars. It is probable he will rent temporarily that part of the factory already equipped with machinery, because there will be ample room in the remainder for his personal needs. It has been reported that some of the makers of essential parts for the Star might locate branch plants in the factory, but so far as can be learned there is no probability of this step being taken.

PACKARD'S BEST MONTH

Detroit, June 10—Packard Motor Car Co. shipments for May, 1922, were 1,746 vehicles, an increase of over 15 per cent over the previous high shipping record made in May, 1920, and an increase of 100 per cent over shipments in May, 1921. In cars shipped and orders booked May was the most successful month the Packard company has had in twenty-three years of operation.

Sales in the retail field in the month amounted to \$5,600,000. Orders on the books as of June 1, 1922, are reported to cover all single-six cars that can be produced in the next three and a half months. Twin-six deliveries are reported to be a month behind. The truck department is reported to be receiving more inquiries than for several years.

NEW STANDARD PRICES

Pittsburgh, June 12.—The new prices of open models of the Standard Eight range from \$2,150 to \$2,500. In the company's advertisement in MOTOR AGE June 8, the impression, which the company desires to correct, was given that all the open models were priced at \$2,150.

Discontinuance of Several Models Is Expected Soon

Detroit Factories Selling Out Some Stocks and Will Concentrate on Other Designs

DETROIT, June 12 — One important effect of the heavy buying in the early part of the year is that it has given manufacturers an opportunity to use up inventories on models which they had planned to discontinue, with far greater rapidity than had been anticipated. As a result of this buying, it is certain that the next three months will find announcements from at least four important companies that they have discontinued manufacturing certain models in their lines.

Two models have already practically been cleaned from the market, the Scripps-Booth by General Motors, and the Briscoe by the now Earl Motors, Inc., In the latter, there are only a few in the roadster and the coupe now unsold, the touring and sedan having found ready sale under the impetus of reduced prices. In both of these makes the service will be continued indefinitely.

Other models which will be taken from the market when the stock of material is exhausted will also be serviced indefinitely by the makers, who will concentrate their manufacturing facilities on other models in their lines. The work of closing out the lines is being carried out quietly for reasons well known to the industry, but unlike the two cars mentioned, these other cars will not be orphans, as the names will be continued in other models.

The fall season is also going to witness the appearance of new models in several other lines, in one of these it will be a complete new line, and in others will be the presentation of new closed models. There are likely to be manufacturing economies emphasized in some of the enclosed car bodies making their appearance, which will probably result in enclosed car prices more closely approximating those on open models.

With all the heavy buying of the early season, there were several important companies which were shipping cars from storage until early in May, and one or two companies report cars in some districts as still slow in moving. This was one reason why May shipments failed to exceed April by a larger margin, as manufacturing in the latter month was far heavier than the total shipments for the two months compared would show.

To Enforce Washington State Truck Load Law

Spokane, Wash., June 12—Two state highway patrol officers armed with loadometers will be placed on duty on Spokane and Inland Empire roads with instructions to arrest motor truck drivers

who overload machines in violation of state motor vehicle laws. H. E. Lakeburg, Olympia, of the state highway patrol department, announces that H. C. Cusack and H. Bliss, former Spokane county deputy sheriffs, have been placed in charge of the loadometers.

The loading law provides that a truck may carry 24,000 pounds, including its own weight, if loads do not exceed 800 pounds per square inch of rubber tire surface.

The first violation of the law may be tried as a misdemeanor; the second may result in suspension of trucking license for 30 days, and a third offense may result in suspension of the license for 90 days. Fines and jail sentences may also be assessed.

Automobile Show Held on City Street

PHILADELPHIA, June 12—The second and open air automobile show of the Northeast Automobile Dealers' Assn. was held on Overington St., between Frankford Ave. and Penn St., with a line-up of 48 models of 17 different makes, shown by a dozen dealers. Large crowds attended both the afternoon and evening exhibitions, and dealers report that several sales of the higher priced cars were made.

The cars stood at the curb on each side of the street. At night the street was brilliantly illuminated, many colored bulbs being used in the lighting. There were two bands playing.

A feature of the show was a display of the mode of transportation of 50 years ago, in which was shown the victoria, brougham, phaeton, beach carriage and other old-time vehicles owned by the family of former Mayor Edwin H. Fuler.

SHORT LINE ADOPTS RAIL CARS

Clifford, Okla., June 9.—Motorized equipment has replaced steam locomotives on the Oil Fields Short Line railroad operating between Clifford and Dilworth, Okla., and connecting with the St. Louis and San Francisco Railroad at Clifford. An FWD rail car with a body capable of carrying 24 passengers makes regular runs. The car is equipped with couplers so that flat cars or box cars may be attached and hauled, thus simplifying freight transportation. This equipment is said to have changed the railroad from an unprofitable to a profitable basis of operation.

SUIT AGAINST HICKS-PARRETT

Chicago, June 9—A petition in bankruptcy was filed yesterday against the Hicks-Parrett Tractor Co., of Chicago Heights, Ill., by three creditors, whose claims aggregate \$657. Officials of the company said they hoped the claims could be adjusted without going through the bankruptcy courts. The company has been operating only on a small scale for some time.

Stutz Co. Gets Opinions of Dealers on Assembled Model

Believed to Be Considering Production of a Lower Priced Car to Complete Line

INDIANAPOLIS, June 12 — Persistent rumors that Stutz Motor Car Co. is considering the production of a moderate priced assembled car to complete its line for dealer distribution seem to be confirmed in inquiries going to parts and unit makers of parts not used in the standard Stutz, and in a questionnaire that was recently circulated to Stutz dealers asking for recommendations for specifications for an additional model that they might think would be beneficial as a marketing factor in connection with the Stutz.

It is understood that composite answers to this questionnaire show that the dealers favor a light six to sell in the neighborhood of \$1,500. It is said that final decision as to whether such a model will be produced and whether it will be built by a nominally separate company will be reached shortly. It is now taken for granted in Indianapolis that the Frontenac, which at one time was coupled to the Stutz organization in an indefinite way, will not be the car to be marketed along with the Stutz, if the rumored plan goes through. There is a lack of action in Frontenac production plans as far as can be learned. The plant that was acquired some time ago has not at this time been occupied by the company, and it is evident that early production on that car cannot be looked for.

In the questionnaire sent to Stutz dealers there were more than 20 questions as to specifications upon which answers were requested, including engine, number of cylinders, type of various units, sort of wheels, fenders, running boards and steps. In addition to price questions, there were questions as to what discount would be considered proper at the price suggested by those answering.

In connection with the rumored Stutz new model, it is noted that Charles Crawford, now chief engineer of the Stutz Motor Car Co., was for years the chief engineer of the Cole, and he is therefore very well versed in the problems of production of assembled cars. If the plan goes through, those who seem to know hint that production will be in process in early fall. Crawford only recently joined the Stutz organization.

Aside from this, the Stutz sales and service conference of dealers, salesmen and service men was held in Indianapolis at the time of the race. Whether the questionnaires were circulated at the time of that conference cannot be learned, as officials of the factory will not discuss the matter nor the rumored plan for an additional moderate priced model to market along with the Stutz line.

Sales and Service Men Get Novel View of Stutz Plant

Visitors Meet Foreman of Each Department and See List of Parts and Operations Performed

INDIANAPOLIS, June 10—In the recent Stutz sales and service conference—a two-day session—the first day was devoted to talks by department heads, and ended with a trip through the factory, during which a somewhat novel plan was followed.

The entire factory was labeled in sections, and arranged like an art exhibit. Along with each exhibit legend appeared the name of the foreman in charge, and he met each of the visitors and became an individual. Department heads are always introduced, but Fred Wilson, general sales manager, says that the new plan of making each foreman personally acquainted with the visiting sales and service men goes a long way to establish the intimate personal relation to which each progressive organization strives. This was one of the things aimed at in the conference.

Another feature was a sheet upon which was listed the number of pieces that enter the Stutz, the number of pieces and assemblies purchased finished, the number purchased rough, the number of assemblies made in the plant, the number of holes drilled, tapped and reamed, and number of pieces of various sorts of metals. The table showed the visitors at a glance the endless details carried on in the plant and the exact amount of the car that is manufactured in the factory, whether entire or from the rough state. The total number of pieces totals 11,907, while the number of assemblies made in the plant totals 308, against 267 purchased finished. The visitor begins to get a grasp of the situation before he gets to the various departments where he can see the operations.

Beside the guides (one to every four visitors) in the trip through the plant, each visitor was supplied with a miniature catalogue of each department. The listing plan was followed out in this. For instance, at the end of the section devoted to a brief description of the machine shop appeared this sentence: "In this department approximately 1,800 holes are bored, 507 holes are reamed, 456 holes are tapped, 640 rough castings are handled and several hundred parts made from bar steel."

Twenty-two departments were handled in this manner, and between the things told visitors by the guides, the sight of the activity and the condensed catalogue and description a very vivid impression of the entire plant was given.

MAY BEST MONTH FOR NASH

Kenosha, Wis., June 10—Factory figures of the Nash Motors Co. show that 23 per cent more passenger cars were sold by the company in May than in April. This makes last month's business the largest

in the history of the company. It was an increase of 211 per cent over May, 1921.

An addition to the Nash plant making four-cylinder cars at Milwaukee will be constructed this summer and will provide greater production facilities.

Dealers Have "Strong Hearts" Club to Boost

COLUMBIA, S. C., June 12 — The monthly meeting of the Columbia Automotive Dealers' Assn. was largely turned over to the Strong Hearts Club, an auxiliary of the association. This club is largely an anti-knockers association and its membership is made up of men who boost their own goods and do not speak against those of their competitor.

The proposed tax on transportation vehicles was condemned by the meeting, it being pointed out that the tax will probably break up the transportation lines now in operation. The legislative committee was instructed to protest against the tax and to see what can be done about it.

REPUBLIC TRUCK PRODUCTION

Detroit, June 10—Republic Truck Co. is now producing between 450 and 500 trucks monthly, or at a rate of approximately 50 per cent of the normal capacity of the plant, President F. E. Smith declares. There is little buying of a farmer nature at this time, he said, the bulk of the business being industrial companies, and originating for the most part in eastern section of the country.

Farm buying is expected to start in July and reports from middle western sales territories indicate that this will be on a fairly large scale, President Smith said. Most of the Republic business is in the heavier vehicles, but light truck buying is developing. Buying is divided about equally between pneumatic and solid tired vehicles, most of the pneumatics being in short wheel-base models.

MORE BUSES FOR WASHINGTON

Washington, June 12—The Washington Transit Co., a local bus line, has been incorporated in the District of Columbia by a special act of Congress and has been granted a charter to operate seven bus lines in the city. The bill provides that the company may charge 8 cent fare, which may be reduced by the public utilities commission.

The additional bus service as a means of transportation was bitterly fought by the two local traction companies who complain that the buses already in operation have so cut into their profits as to seriously warrant an additional increase in street car fare, which is now eight cents. With the inauguration of the new company, Washington will have in operation more than 125 buses on 17 lines.

Rolls-Royce Designer's Statue Exhibited in Royal Academy



LONDON, June 10—A life-size statue in bronze of F. Henry Royce, engineer-in-chief of the Rolls-Royce Co., is being exhibited in the sculpture section of the Royal Academy. The statue is the work of Derwent Wood.

The inscription on the granite pedestal reads:

"F. Henry Royce, Engineer, born 1863, at Alwalton, near Peterboro. Owing to misfortunes in childhood, he was almost entirely self educated. His work includes the design and production of the Rolls-Royce motor cars of world-wide reputation, which were used for most important work in the Great War; and also the design of the Rolls-Royce aero engines, of which a greater horse-power was employed by the Allies than of any other design. Aeroplanes with these engines made the first direct flight from England to Australia. This statue was erected by the shareholders of Rolls-Royce, Ltd., in 1921, at which date he was still serving the company as engineer-in-chief."

At the conclusion of the Royal Academy exhibition the statue will be erected in the town of Derby, where the Rolls-Royce works are situated.

TO PUSH BOSCH SALES

Springfield, Mass., June 12.—Branch managers of the American Bosch Magneto Corp. decided at a convention at the factory that with business conditions rapidly improving, a vigorous and intensified sales drive should be made immediately with the idea of taking full advantage of increasing sales possibilities.

Automobile Finance Men Hold First National Convention

Adopt Constitution and Launch Membership Campaign to Cover Country, at Indianapolis

INDIANAPOLIS, June 10—The first annual convention of the National Assn. of Automobile Finance Companies was held here this week, attended by representatives of 50 companies, who carry on a total combined business of more than \$1,000,000,000 a year.

The morning sessions were given over to committee meetings and the meeting of the board of directors, at which by-laws, reports and proposed activity for the association were discussed and planned. Among the projects discussed was that of districting the country into eight parts, and having district meetings at more frequent intervals in order to expedite the growth of the organization and to enable other development work. At present the national organization membership is confined to state and local finance associations, with a national headquarters in New York City, and local headquarters in New York, Chicago, Pittsburgh and Detroit. The districting plan was held for future consideration.

At later meetings the by-laws were adopted as proposed and a drive for membership and further extension of the national work was launched.

Movement toward education campaigns and active work to show the need of more uniform state laws governing finance operations was considered favorably by the convention in its endeavor to provide in the future the most dependable sort of service to the automotive industry, and to simplify the operation of such companies as operate over wide areas.

At the close of the afternoon session, C. A. Vane, general manager of the National Automobile Dealers' Assn., addressed the convention and told of the new program of the association, and how successful association work in all lines now must hold the interest of the public superior to its own interest.

During the day the Indiana Finance Assn., which acted as host to the national convention, held its meeting and elected the following officers for the year: President, Frank A. Fisher, Indianapolis; vice-presidents, C. H. Stratton, Sullivan; Roy Myers, Evansville; F. A. Shively, Lafayette; Edmund Bittler, Ft. Wayne; secretary, Joe Twitty, Indianapolis, and treasurer, Ben Sagalowsky, Indianapolis. The banquet in the evening was addressed by Fred A. Weber, Jr., national president; Walter E. Heller, first vice-president, of Chicago; S. S. Stratton, president of the Commercial Acceptance Trust; Henry Warrum, president National Auto Insurance, and ex-Mayor Charles A. Bookwalter. President Weber said that the first convention was more successful than the directors had hoped

and that the automotive industry could depend on better finance companies and better methods and more complete co-operation from now on.

Reckless Driver Is a "Flivverboob"

WASHINGTON, June 22—"Flivverboob" is the name best describing the reckless and careless automobile driver in the same way that "jay-walker" denotes the careless pedestrian, it has been decided by the judges of a contest conducted by the American Automobile Assn. The name was suggested by F. B. Simpson, of Cedar Rapids, Ia., who wins the \$25 in gold offered as a prize by the A. A. A.

More than 10,000 names were submitted in this contest and the suggestions came from all parts of the United States. The committee selected to pass on the suggestions consisted of Col. C. O. Sherrill, head of Public Buildings and Grounds, Washington; Dr. Frank W. Ballou, superintendent of public schools, Washington; Inspector Albert J. Headley, head of the D. C. traffic department; Charles W. Semmes, president of the Semmes Motor Co., and Isaac Gans, Washington business man.

Shop Equipment Makers Join In Advertising Campaign

Chicago, June 12—A group of automotive shop equipment manufacturers, consisting of the following, have associated themselves in a co-operative advertising campaign to establish the necessity for up-to-date equipment in the automotive repair shop:

Albertson & Co.
T. R. Almond Mfg. Co.
Berger Mfg. Co.
Black & Decker Mfg. Co.
Burton Rogers Co.
Canedy-Otto Mfg. Co.
Continental Auto Parts Co.
Greenfield Tap & Die Corp.
Jacobs Mfg. Co.
Manley Mfg. Co.
Mid-West Mfg. Co.
Frank Mossberg Co.
Alexander Milburn Co.
Oxweld Acetylene Co.
B. L. Schmidt Co.
Weaver Mfg. Co.
Weidenhoff Products.
Wright Mfg. Co.
Penn Rivet Corp.
American Bureau of Engineering.

The campaign is being conducted in a small way at the present time, involving the expenditure of only \$10,000 to \$15,000, but it is expected to grow.

The slogan which has been adopted for the campaign is, "The Well Equipped Shop Gets the Business."

HOUSE TARIFF RATE STANDS

Washington, June 8—When the section of the tariff bill relating to automobiles came up before the Senate finance committee recently, it provoked little discussion and no change was made by the committee in the House rate of 25 per cent ad valorem.

Congress Passes Bill for 3-Year Highway Program

President Expected to Sign Measure Calling for \$50,000,000 for Roads in 1923

WASHINGTON, June 9 — President Harding is expected to sign the Post Office appropriation bill which passed the House and Senate today. The bill is of importance to the automotive industry as it authorizes appropriations for a three-year highway program. The report of the conferees recommending an authorization of \$50,000,000 with certain contractual rights left to the states to protect their situation was accepted.

The conference report as approved by Congress provides for an authorization of an appropriation of \$50,000,000 for the construction of post roads during the fiscal year 1923 and also carries authorizations but not actual appropriation for \$65,000,000 in 1924 and \$75,000,000 in 1925, and in addition \$6,500,000 annually during these last two years for construction of forest roads.

The new legislation reduces the limitation per mile of Federal aid from \$20,000, making a limitation of \$16,250 a mile for the year 1923 and \$15,000 thereafter. The good roads bureau proposes to build roads two feet wider and also make them four inches thicker because of the heavy traffic due to the increased use of automobiles.

OSHKOSH TRUCK CO. REFINANCED

Oshkosh, Wis., June 10—By unanimous vote of stockholders, an amended plan for refinancing the Oshkosh Motor Truck Co., has been put into effect. The sum of \$76,000 has been provided which will make possible the liquidation of a considerable portion of the indebtedness and such an extension of time on the balance as will insure the safety of the company. The amount of \$43,000 has been subscribed by stockholders, and trucks on hand and in process when the business lump overtook the truck industry to the amount of \$33,000 have been sold. The reorganization of the Oshkosh Motor Truck Sales Co. recently enabled the company to market considerable of the surplus, the remainder of which is steadily being absorbed, enabling the company to resume output on a fair scale, with prospects of a nearly normal schedule of production within a relatively short time.

ANTI-THEFT CONFERENCE

Davenport, Ia., June 12—Officials in charge of state automobile departments in Illinois, Missouri, Nebraska, South Dakota, Minnesota and Wisconsin have been invited by Walter C. Ramsay, secretary of state of Iowa, to participate in a conference in Des Moines the week of June 25 to obtain more uniform registration of cars through the middle west states in an effort to curb automobile thefts.

Illinois Association Plans Fall Membership Campaign

Dealers to Combat Legislative Tendency to Regard Automobile as Revenue Producer

CHICAGO, June 10—The seriousness of the legislative situation that will confront the automotive industry in this state was reviewed at the meeting of the board of directors of the Illinois Automotive Trade Assn. here Tuesday, and it was decided there was a vital necessity for a membership drive in the near future.

The tendency of the lawmakers to look upon the automotive vehicle as a revenue producer looms large, and there is every prospect of a number of restrictive bills at the coming session of the legislature. The state association did effective work at the recent session, and it is desired to build a large membership, that the spokesmen for the industry will be well backed.

This membership drive will be organized for early September, and picked dealers will be asked to take two days to canvass the dealers within their appointed territories.

It was decided that the state association should work wherever possible through county or tri-county associations. These will be organized on a basis similar to that of the Peoria association, which was outlined by the state body, and the state association will supply information to keep the various local associations active. President B. B. Burns of Decatur presided. Representatives of the various sections of the northern part of the state were present.

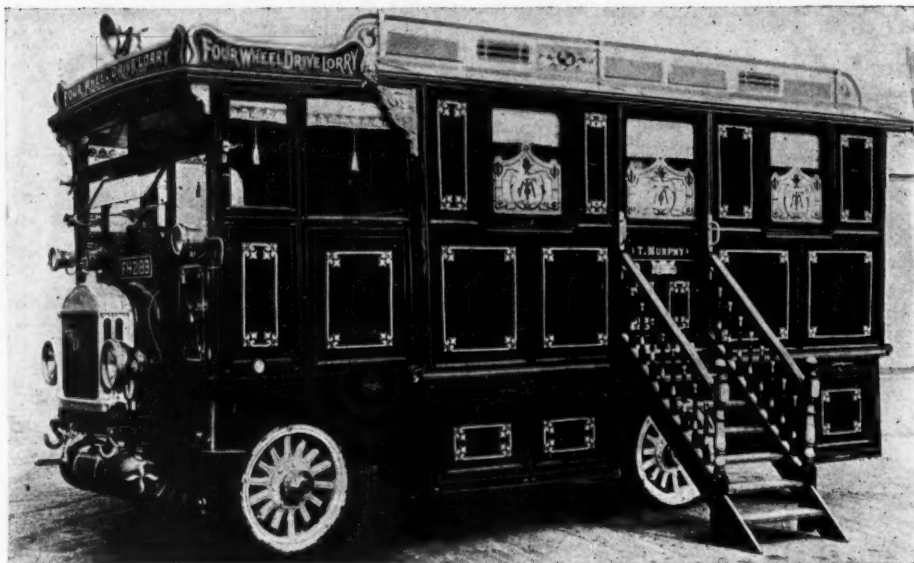
TO EXHIBIT AT PAGEANT

Chicago, June 10 — Dealers handling more than 30 makes of automobiles have taken exhibition space for the Chicago Pageant of Progress, to be held on the Municipal Pier July 29 to Aug. 14. Automobile exhibition space is being allotted through the Chicago Automobile Trade Assn. Officers of the association consider this a good opportunity to show cars, as the pageant is attended by thousands of persons from the whole middle west territory.

NEW CANADIAN TAX ON CARS

Ottawa, Ont., June 10—Considerable opposition has developed to new excise taxes imposed on automobiles in the hands of dealers under the law which became effective May 23. Under the new law, cars selling for \$1,200 or less are taxed 5 per cent, and those selling for more than \$1,200 are taxed 10 per cent. In addition to these taxes, a sales tax which heretofore has been 3 per cent has been increased to approximately 4½ per cent. All of these taxes, of course, are passed on to the purchaser. The tax applies on automobiles manufactured in Canada as well as those imported.

Showman's Luxurious Automobile Home



LONDON, June 3 — An elaborately equipped motor truck is being used as living quarters by T. Murphy, traveling showman, of London. The truck chassis is a FWD, manufactured in Clintonville, Wis. Mounted on this chassis is a van body of special construction,

divided into two rooms completely furnished. One is a bedroom and the other is a living room. The living room contains a piano and small stove. The interior is finished in solid mahogany. The cost of the body was approximately \$9,000.

DETROIT PAYROLLS INCREASE

Detroit, June 10—Another increase of 3,789 in the number of men on the payrolls of the Employers Association was reported last week. The total now is 170,126, a new high mark for the year, and only 18,000 less than in the corresponding week of 1920.

Lots of Camping Outfits Being Sold

MOLINE, Ill., June 10—Camping equipment was carried by seven out of every ten automobiles observed on California highways recently by W. O. Butterfield, engineer for Velie Motors Corp.

Butterfield, who recently returned from a trip to California, said: "A short time ago, driving along the roads in California, I was impressed with the number of tourists. I kept count for some time, and found that seven out of every ten cars on the highways carried camping equipment. This should mean a big wave of automobile tourists to the northwest this season."

USED CAR EXCHANGE AT ELGIN, ILL.

Elgin, Ill., June 12—Elgin automobile dealers have voted to organize a stock company and operate a used car exchange. Articles of incorporation will be asked for from the secretary of state. Dealers will have the option of taking out stock by paying all cash or part cash and part used cars. The Elgin dealers will incorporate into their company the ideas which have been found advantageous at Quincy.

Committee Approves Ford's Offer for Muscle Shoals

Washington, June 10 — The military committee of the House has decided by a vote of 12 to 9 to recommend acceptance of the proposal of Henry Ford for the development of the government's vast power and nitrate projects at Muscle Shoals, Ala. A hard battle over the report is expected when it comes up for discussion on the floor of the House.

In reaching its decision, the committee decided to eliminate from the properties covered in the Ford offer the steam plant at Gorgas, Ala., and it agreed with representatives of Ford on new language relating to the manufacture of fertilizer. In all other respects the Ford offer was fully approved.

MAINTENANCE MEN ORGANIZE

Chicago, June 10—A permanent committee composed of managers of the maintenance departments of members of the Chicago Automobile Trade Assn. has been organized as an auxiliary unit of the association. F. M. Paull of the Dashiell Motor Co. was elected chairman and J. F. Paige of the Packard Motor Car Co. was elected vice-chairman. The committee will hold one meeting a month.

NEW STYLE AIR COMPRESSOR

Fort Wayne, Ind., June 12—A new type of equipment in the air compressor line for filling stations, service stations and garages is being made and marketed by the Wayne Tank & Pump Co. of this city. The new addition to the Wayne family of products is a horizontal air-cooled, two-stage air compressor.

IN THE RETAIL FIELD

Two trainloads of Overland and Willys-Knight cars have been ordered for the Omaha territory, according to F. H. Wyght, local retail sales manager, who recently returned from a sales convention at the Willys Overland factory in Toledo.

Announcement is made that the Changstrom Motor Co., Omaha, Neb., has taken on the Velie line in connection with the Wescott.

Carringer & Borschel Sales Co., Cedar Rapids, Ia., has been appointed Franklin distributor in that territory.

Blue Ribbon Auto Sales, Inc., has taken the agency for the Stephens Salient Six car in Springfield, Mass., and vicinity.

R. & V. Motor Sales Co., Springfield, Mass., has become an authorized sales agency for the Gould Dreadnaught battery.

A. Parke Shaw, Wilks Ste. Claire agent for Berkshire Co., Mass., and Bennington Co., Vt., will have his headquarters in the salesrooms of the Wendell Motor Supply Co. in Pittsfield, Mass., and will also act as sales manager for Smith & McCarty of the same city.

Tenison & Blair, Marmon dealers and distributors at Dallas, Tex., held open house last week in their new home. The new building is three stories high and covers half a block. It cost more than \$250,000. The company announced it had taken over the Oldsmobile line and the Republic Trucks. Thousands of persons visited the housewarming and a large number of sales were reported.

Worsham Bros., dealers and distributors for Hupmobiles and Franklins at Houston, Tex., occupied their new \$150,000 home last week. The new home of this company is three stories high and has more than 21,000 sq. ft. of floor space.

Benluf Rubber Co., incorporated at Toledo by Benjamin Love, has taken over the distribution of Ajax tires in northwestern Ohio and southern Michigan. Salesrooms are located at 312 Eighteenth St.

R. A. Porter and H. D. Watkins of Champaign, Ill., have formed a partnership and opened a sales agency and maintenance station at 349 E. William St., Decatur, Ill. They succeed the Oakland Sales Co., but will only handle the distribution of the Hupmobile in the Macon county territory. In addition, the firm will handle Oakland parts and take care of the service of the latter car, but will not be in charge of the sales.

Willys-Overland branch at Toledo, O., sold 373 Overlands in May. Of these, 167 were sold from the central store and the rest by local dealers. The branch also sold 71 used cars during the month, as compared with 41 in May, 1921.

Travis-Cadillac Co. has been organized at Jacksonville, Ill., and will have quarters at 116 North East St. A. J. Davis, late of the Cadillac agency in Peoria, has been appointed manager and George Gilligan, late of the Cadillac factory, has been placed in charge of the maintenance department.

Cassidy Tire Co. of Portland, Ore., has taken the agency for India tires.

Automotive Exchange at West Allis, Wis., has been incorporated with a capital stock of \$25,000 by Peter A. Streef, Courtland Babcock and A. F. Toppins. Babcock is head of the Babcock Auto Spring Co., Milwaukee.

Percy Williams & Co., Maxwell dealer, Mil-

waukee, has moved into the building at Fourth and Cedar Sts., vacated June 1 by the Bachman Motor Car Co., distributor of the Dort, which is now housed in its new \$75,000 sales and maintenance building at Van Buren and Mason Sts.

Van Buren Garage, Inc., Milwaukee, which completed a new garage only a few months ago, has started work on an addition which will duplicate the original building, 90 x 127 ft., two stories. The addition will be used principally for maintenance departments and storage.

Weihaupt-Savage Auto Co., Inc., La Crosse, Wis., has been appointed district distributor of the Maxwell. The concern is Cadillac and Reo dealer. John Weihaupt, president, was Maxwell dealer before entering war service, and in the earlier days of his association with the Maxwell, sold 1,000 cars in this territory.

Kudrna Bros., Phillips, Wis., have been appointed Chevrolet dealer. They have been for several years local dealer for the Bates Steel Mule tractor.

A three-day meeting of Stutz dealers was held May 29, 30 and 31 at the factory at Indianapolis. Consensus of opinion among the dealers was that their business had greatly improved since the introduction of the new Stutz model.

Wills Sainte Claire Chicago branch is moving to larger quarters at 2330 Michigan Ave., Chicago.

John Dornette, Jr., has been appointed distributor for the Cole car in the Cincinnati territory. Dornette and his business associates will occupy a salesroom located at 316 Reading Rd.

Cole Motor Car Co. has announced the establishment of a new selling connection in Havana, Cuba, the Cole Cuban Car Co.

A typographical error in MOTOR AGE of June 1 made the sales manager of Doan Motor Co., Toledo, say that at that time his company was 21 cars short of orders on file, when in fact the number of cars short was 221.

Northwest Nash Motors Co. has been organized at Minneapolis by James H. Ramsden and has been granted the Nash distributing franchise for Minnesota, North and South Dakota, Northern Wyoming and part of Montana. Ramsden has been manager of the Nash Sales So.'s Minneapolis branch for five years.

Chas. W. Hallar Motor Co. has taken over the Chevrolet Motor Co. retail store at 3430 Chestnut St., Philadelphia, and has incorporated as the Quaker City Chevrolet Sales Corp., with a capital of \$100,000. Charles W. Hallar is president.

H. B. Tait & Co., at Long and Jefferson Aves., Columbus, central Ohio distributor for the Overland and Willys-Knight, has also been made central Ohio distributor for the Marmon.

Dependable Truck Service Co., Springfield, Ill., has been incorporated with \$15,000 capital stock to operate motor trucks to haul freight.

White Motor Co., Cambridge, Ill., has sold its Galva, Ill., Ford branch to Fred Richert and Lee Carpenter of Rockford.

Wilsunshild Co., 5631 S. Halsted St., Chicago, has been incorporated for \$20,000 to manufacture and deal in automobile accessories, glassware and windows.

Frank Strehle of West Point, Neb., has purchased the Wendt garage in that city for \$14,000.

J. J. Aldrich, one of the pioneers in the used car field in Columbus, has sold his place of business at 170 N. Fourth St. to C. C. Fioren.

Advertising Sells Cars, Says Successful Texas Dealer

Well Planned and Persistent Campaign Brings Increased Business, He Finds

FORT WORTH, Tex., June 10—A well studied, closely planned and persistently pursued advertising campaign is as essential in the selling of automobiles as any other line of goods, says J. R. Overstreet, distributor for the Hupmobile in Texas, with headquarters here.

Overstreet says that in the first five months of this year he sold a much larger number of cars than he did for the first six months of the last year, and that he expects to dispose of 500 cars before the year is gone.

"I set aside a certain sum of money for advertising in my territory this year, regardless of the number of sales made," he said. "I planned that advertising campaign before it started. The advertisements followed each other in natural order. They were pulling, compelling and truthful. At first I could not see the difference in sales. But the campaign continued, and will continue for the year. It will probably be enlarged upon next year.

"I see the results now. The sales are growing. Hup advertising is being kept continually before the people, and in the papers they read. We are not overlooking any good bets. We will extend rather than curtail advertising. It is as essential in the automobile business as any other line."

Overstreet continues to appoint Hup agents where he can find a good one. He helps these agents reach the people through advertising in their local papers.

"Costs money," he said, "but it pays for itself a dozen times. We will keep it up. 'It sells cars, and that's our business.'"

NEW PILOT SPORTSTER

Richmond, Ind., June 10—The Pilot Motor Car Co. has a sportster model, deliveries of which began on June 1. It is of the four-passenger type and carries barrel type headlamps, with cowlamps to match. The runningboards are displaced by aluminum side steps with individual fenders, and there is an aluminum trunk rack with protecting bars on the back of the body and other specially built features not heretofore used by the Pilot organization.

WEEKLY USED CAR BULLETIN

Chicago, June 10—The Chicago Automobile Trade Assn. has inaugurated a weekly used car bulletin for distribution among its members. The bulletin contains a list of the used cars which the various members have on hand, average prices asked, the list of used cars sold during the previous week and the average selling prices. Only those dealers who co-operate by supplying the desired information will receive the report.

Plan National School to Study Transport Problems

Washington, June 12—Plans are under way to have congress father a novel school of inquiry, to be known as the National Transportation Institute, to deal primarily with transportation problems, but in an entirely different way from the methods pursued by any present Federal agency. It is to be conducted somewhat along the lines of the Rockefeller Foundation.

The Joint Commission of Agricultural Inquiry is sponsor for the school. It proposes the establishment of a private research and educational institution.

\$1,700,000 AUTOMOBILE LOSSES

Hartford, Conn., June 10—Automobiles having an aggregate value of \$1,700,000 were stolen, "lost" or burned in Connecticut last year, according to figures compiled by the Automobile Underwriters' Detective Bureau. Of these, 370 were stolen outright, involving losses of slightly over \$500,000, while over 800 were burned, at an aggregate loss of \$1,120,000, and 50 were disposed of in other ways, making a total of 1,220 reported in all classifications. The report estimates that probably 90 per cent of the burned cars were deliberately destroyed in fraudulent efforts to obtain approximately \$1,000,000 in insurance.

CONCERNING MEN YOU KNOW

S. A. (Sam) Miles, show manager of the National Automobile Chamber of Commerce, sailed from Liverpool last Saturday on the *Acquatanian* on his way home with Mrs. Miles, after their annual visit to Europe.

Henry Paulman, Pierce-Arrow distributor in Chicago, recently assisted in raising a fund of \$5,000 to be used in repairing the Immanuel Baptist Church on automobile row, which was partially wrecked by a wind storm.

Vern Schuller has been appointed general manager of the Callahan-Krause Motor Corp., authorized Ford dealers, at 2441 S. Michigan Ave., Chicago.

Alvin T. Hardin, Danville, Ill., senior member of the garage firm of English & Hardin, that city, his wife and the latter's mother were killed and a 17-year-old son of Hardin perhaps fatally injured when the automobile in which they were riding was struck by a locomotive at Busseron, Ind.

Robert M. Lauer, comptroller of the Federal Rubber Co., Cudahy, suburb of Milwaukee, has consented to be a candidate for the Republican nomination for member of Congress from the Fifth Wisconsin district, now represented by W. H. Stafford.

J. W. Whitley has been appointed Southeastern sales supervisor of the Rickenbacker Motor Co. He will have headquarters at Atlanta, Ga. For the last nine years he has been with the Saxon Motor Car Corp.

Federico A. Serra Lima, South American automobile racer, arrived in New York May 29 on the S. S. American Legion. He is Buenos Aires representative of the Hudson Motor Car Co. and of Buxton Guilay & Co. of England.

L. Z. Stone, formerly with Diamond Tire Co.

and Goodyear Co., has been appointed sales promotion manager and director of the Vacuumeter Mfg. Co. of Cleveland.

C. H. McKeen, for 10 years an eastern sales representative of the Apco Mfg. Co., maker of automotive equipment, has been appointed sales manager for the company, effective June 1.

S. S. Soglovitz has been appointed sales supervisor in the province of Quebec for the Maxwell Motor Co. of Canada, Ltd. Formerly he was associated with Cleveland Tractor Co. as a sales supervisor in Europe, North Africa, Canada and the United States. He was connected with Ferro Motor Co. and the White and Peerless companies in the early days of the industry.

H. M. Stephens has been appointed district manager for the Cadillac Motor Car Co. in the eastern states, having been a special representative for the company during the past year. Stephens was construction engineer of the new Cadillac factory in Detroit.

Clyde Parsely of Omaha, formerly with the Packard company, will manage the Lincoln distribution with the McCaffrey Motor Co., Omaha dealers for the Lincoln.

Hale R. Bixby, who has been associated with the Omaha automobile row for several years, has taken charge of retail sales for the Omaha branch of the Lee Tire & Rubber Co.

Clifton Reeves, industrial engineer at the Willys-Overland plant, Toledo, has been appointed a member of the board of directors of the Toledo Y. M. C. A.

James Cranick, formerly with the Welbon-Toledo and Doan Motor Co., Toledo, has taken charge of the used car department of the Sturdevant-Jones Co., dealers in Marmons and Hupmobiles.

Maxwell to Maintain High Production Through June

Detroit, June 10—Maxwell Motor Corp. will carry production through June at the high rate which has marked May, present orders already indicating that this will be necessary. President W. R. Wilson said a falling off in business is looked for during July and August, but he is convinced that fall business will be brisk and that business through the winter will be steady. Important increases are looked for by him in 1923.

The company was handicapped in its production during April and May through difficulty in getting material and labor scarcity, he said. In the Maxwell's case, this difficulty is with raw material and steel, as it is a company which builds practically every part of its product in its factories at Dayton, Newcastle and Detroit. Coal supply at its several plants is ample, Wilson said, but difficulty in obtaining steel is being attributed to the coal situation.

SHOW AT AURORA, ILL.

Aurora, Ill., June 12—Preliminary arrangements have been made for an automobile, truck and tractor show at the new fair grounds of the Central States Fair and Exposition Co. near Aurora, Aug. 18 to 26. L. L. Fest of Chicago has been appointed general manager. The coming event will dedicate the new buildings and grounds of the exposition company.

It is planned to stage a motor vehicle show annually. The exhibition hall is large enough to hold several hundred machines, and is so arranged that all

will show up to advantage. For this reason, it is expected that there will be a large number of entries. There will also be space for accessory exhibits.

5,000 CARS IN STYLE PARADE

Dallas, Tex., June 10—At least 5,000 automobiles took part in the motor parade and style show held here during the Southwest Durbar. As a result of the style show, dealers report a number of sales were made and a very great interest stimulated in the automobile business. One of the features of the week was a "Ford roundup," in which no less than 4,000 Fords took part. The Dallas dealers, having the style show over, are now working on plans for their biggest automobile show of the year, that to be held in October in their specially constructed building at the State Fair Grounds. This show will last 15 days.

REFER ANTI-SPOTLIGHT BILL

Toronto, June 10—The bill to ban the use of the spotlight in Ontario and the bill to enfranchise and control motor buses has been referred to the select committee of the legislature, which has been appointed to unify and clarify the three acts dealing with motor vehicles and highway travel, during the summer and autumn recess.

COLE INCREASES 100 PER CENT

Indianapolis, June 10—Production of Cole automobiles in May was 100 per cent greater than in May of last year, according to a factory announcement. The schedule for June has been increased 100 per cent over the May schedule.

Difficulty of Using Radio for Dealers' Service Trucks

Expert Says Government Should Allot Short Wave Length for Automobile Communication

BOSTON, June 10—For the benefit of automobile dealers who are considering the use of radio outfits for service trucks, H. J. Tyzer, of the American Radio Assn., explained what they would be up against when he spoke to the members of the Electric Vehicle Bureau here. He told of two power companies in the south that were using radio service now, but under a handicap, and explained why.

"The United States government controls the air," he said. "It is possible to put in a transmitter in a service station, and to equip motor vehicles with receivers by using the loop antennae. But to get real service as through a telephone, the driver must be able to talk back. At present he could not call the service station because he has not been allotted a wave length. In other words, the wave lengths are controlled and allotted by the government to prevent a jam in the air.

"Now what is needed is for the motor people to get together and ask for a certain wave length. Because of the short distance between the ordinary service station and the truck, say about 10 or 15 miles, a short wave length would die. Once this is arranged, all dealers could get licenses to equip their vehicles for radio. And, similarly, the owners could do the same.

"The electric truck is better adapted for the radio than the gasoline vehicle, because it has a higher voltage of batteries, running up to 80. But it would be possible to use the battery on a gasoline vehicle for the short wave length. It is feasible, and in time we shall think nothing of the motor driver calling up his headquarters and getting information about what is wrong, where to go and how to do it."

JUNE FINE FOR PEERLESS

Cleveland, June 10—May was the largest sales month in the entire 21 years' history of the Peerless Motor Car Co., and June is going to eclipse May, according to prospects based on a comparison of orders at the start of the two months.

Since R. H. Collins, formerly of General Motors, and whose name is associated with past successes of the Cadillac, took hold of the management of Peerless the company has forged ahead at a more rapid rate than it had in recent years.

The climax of the success came in May, when the previous record month, March, 1920, was surpassed. Statistics are being gathered in the outside territory and sales figures will not be available for several days.

BUSINESS NOTES

Standard Body Co., organized at Appleton, Wis., early in 1920, to manufacture motor car and truck bodies, has been dissolved. George H. Schmidt, president, is retiring from the body business to devote his entire time to the Standard Mfg. Co. of Appleton, which has recently enlarged its saw and planing mills, interior wood-work plant and box factories.

Automobile Accessories Business Assn. of Philadelphia will hold a June outing, probably the third or fourth Friday. George L. Fischer, chairman of the outing committee, has announced that traveling men will be invited for the first time.

Dunning Auto Devices Co., 68 W. Monroe St., Chicago, has been incorporated for \$25,000 to deal in and manufacture spark plugs and electrical appliances.

Prall Motor Co., 627-29 Cottage Grove Ave., Chicago, has been incorporated for \$20,000 to deal in automobiles and accessories.

Auto Truck Garage Co., 1130 Clay St., Chicago, has been incorporated and will deal in motor vehicles and supplies and will operate a garage.

Otto Stroberger, manufacturer of automobile parts at Creighton, Neb., has moved his plant to Fremont, Neb.

Officers of the Lansing branch of the National Association of Purchasing Agents are C. C. Richardson of the Motor Wheel Corp., president; George E. Smith, Reo Motor Car Co., vice-president; J. W. Gier, Motor Wheel Corp., treasurer, and E. W. Goodnow, Atlas Drop Forge Co., secretary. These officers, with Herbert Henry of Gerson-Carrey Co., Homer D. Luce of Hugh Lyons & Co., and L. A. Kosht, Reo Motor Car Co., comprise the board of directors. Richardson is also a director of the national association, to serve two years.

Mitchell Motors Co., Inc., Racine, Wis., announces reorganization of its sales division. A. G. McMillan, formerly general manager of the New York branch, has been appointed director of sales at the factory. John Tainsh will continue as general sales manager. Paul C. Lott, formerly with the New York branch, has been appointed sales promotion manager. G. N. Bliss will be eastern sales manager, controlling territory east of the Mississippi river, and Fred T. Yeager will be western sales manager, controlling territory west of the river.

Wells Mfg. Co., Fond du Lac, Wis., manufacturer of automotive electrical equipment and devices, has doubled its operating force in the last 30 days. It also has established a new department manufacturing radio equipment.

Delco Light Co. of Dayton, O., a division of

General Motors Corp., has formed the Delco Light Co. of Canada, Ltd., and opened offices and a factory at Oshawa, Ont. R. L. Meyers is manager.

A one-story garage at Omaha, located just west of the corner of Twentieth and Harney Sts., was purchased last week by the Boston Ground Rent Trust for \$112,500.

Timken Roller Bearing Co., Canton, O., has increased wages of all shop employees 10 per cent. Salaries of other employees have been adjusted to make the pay same as it was prior to Sept. 1, 1921, when wages were cut.

Covey-Ballard Motor Co., 601 S. State St., Salt Lake City, Utah, will erect a \$200,000 building at Main St. and Fifth South in the near future. Manager Melvin R. Ballard said it would be 82½ ft. wide, 315 long and three stories high. This company was organized a few months ago and handles Ford cars.

Owing to the retirement of Mr. Binford, the Binford-Kimball Motor Co. of Ogden, Utah, will hereafter be known as the Wattis-Kimball Motor Co., W. H. Wattis, well-known business man of Ogden, having purchased the Binford interests in the company. Wattis has announced himself as a candidate for U. S. senator next fall.

Hudson Motor Car Co. of Ill. is erecting a new building at 2220 S. Michigan Ave., Chicago, which is expected to be ready for occupancy by Oct. 1.

Republic Rubber Week will be observed in Youngstown, O., the week of June 12, Mayor George L. Oles having issued a proclamation to that effect, in appreciation of the Republic Rubber Corp., one of the city's largest industries.

Hayas-Ionia Co., Grand Rapids, reports the closing of contracts for \$15,000,000 worth of bodies, to be completed by June 1, 1922, about \$12,000,000 of which represent bodies to be furnished for the Durant Motor Co. The new orders will require the addition of two units to the present plant, work on which will be started at once. The company is turning out 70 bodies a day at present, and it will be necessary to increase this capacity to 150. The present working force will be increased from 950 to 1,500.

The Dornette Motor Car Co., Cincinnati, O., has been chartered with a capital of \$25,000 to deal in motor cars and do garage business.

Autoist Defendant Service Co., Cleveland, O., has been incorporated under Ohio laws for the purpose of defending persons who are arrested for traffic offenses.

Columbus Buggy Parts Co. is the name of a new concern at 572 E. Mount St., Columbus, O., to deal in used cars and parts for all makes of cars. Fred Worthman is general manager.

were moved to larger quarters recently on the tenth floor of 20 E. Jackson Blvd., Chicago.

BLOOMINGTON USED CAR EXCHANGE

Bloomington, Ill., June 12—Members of the Bloomington Automobile Dealers' Assn. have voted to organize a stock company and operate a used car market. A committee was appointed to secure articles of incorporation under the laws of Illinois. It is expected that Jesse Siegfried, who was recently appointed appraiser of all used cars, will be appointed manager and have general supervision over the sale of the used cars as well as the appraisal. The first week as appraiser he examined 34 cars.

DEATHS DUE TO CARELESS DRIVING

Austin, Tex., June 10—Of the 103 persons killed in railroad accidents in Texas during the year 1921, careless driving of automobiles was the cause of 78 deaths upon railroad crossings, according to a report just issued by the State Railroad Commission. All told, there were 200 railroad accidents in Texas during the year, 136 of these due to automobiles.

Big Demand for High Priced Automobiles in Cleveland

Many New Cars Sold in May, With Dealers in Lower Priced Lines Behind With Deliveries

CLEVELAND, June 10—Never have so many new automobiles been seen on the streets of this city as now.

The medium priced cars have been selling at such a pace that dealers, who underestimated the demand that would be made upon them, have experienced difficulty in keeping up with orders. But the dealers in higher priced cars have had unexpected demands made upon them.

Cleveland is one of the best markets in the middle west for Cadillac automobiles, according to figures compiled at the local agency. T. H. Towell, head of the agency, said May was the biggest month in the history of the company for Cleveland deliveries. During the month, 87 cars were delivered here and five in the balance of the territory comprising this district.

"The Cadillac buyer now buys a car for investment," said Towell. "Formerly he bought merely as a means for transportation, particularly during the war and during many months immediately after the war. He bought a car merely to get somewhere."

Towell declared that the purchaser of an automobile now insists on knowing of the company's service, and along this line he makes an investigation quite as judiciously as if he were buying real estate and ascertaining its claim of clear title. He says that 75 per cent of the cars sold in this city by his agency are handled by women, and the flexible control is given as the reason for the popularity of the car with women.

J. N. Wolfinger, sales manager of the Packard agency here, says that price is not the big question with the people that come into his offices. They come for value first. The Cleveland-Packard agency is 100 deliveries behind orders for the new single six, and very few less orders behind for the twin six. Wolfinger is another dealer who says that investment is the big feature with the men and women who come into his store to look over cars.

The Peerless agency here has about the same experience. This agency is likewise behind in deliveries, although the factory is in this city. The factory, however, has been operating at capacity for some time and finds that its orders are coming in at a faster rate than shipments are going out.

S. A. E. SUMMER MEETING

New York, June 12—The summer meeting of the Society of Automotive Engineers will be held June 20 to 24 at White Sulphur Springs, W. Va. Hotel reservations indicate an attendance of about 600.

American Steam Truck Co. Turns Out First Passenger Car

CHICAGO, June 10—The American Steam Truck Co. this week turned out from the factory its first steam five-passenger phaeton, which the company plans to sell at \$1,650. Four more of the cars are being assembled in the plant here, and will be on the streets within a few days, according to R. R. Howard, president of the company.

A production schedule has been arranged for 100 cars to be turned out as soon as possible after the first five have been completed, Howard said. The company's first steam truck was produced about six weeks ago.

In a bulletin sent this week to stockholders and salesmen, the company announces that exclusive agency rights for the steam car will be sold in given territories. Contracts of this kind already made aggregate \$300,000, the announcement says, and it is figured that when the whole of the United States has been covered more than \$2,000,000 will have been realized from this source.

The general offices of the company

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Must Gasoline Pumps Be Painted Red?

Q—We have been informed that a gasoline pump painted yellow is against the law. Is this true? The pump is 16 ft. from the building and has the word "Gasoline" printed on it in a conspicuous place.—A Reader.

A—There is a statute reading:—

"That all receptacles for gasoline or benzol used in the retail trade, except tank wagons or trucks, shall be red and shall be labeled "gasoline" or "benzol," as the case may be, in letters of a contrasting color and a height of not less than one-half inch, and it shall be unlawful in such retail trade or anything pertaining thereto to put gasoline or benzol into any receptacle of any other color than red and not labeled as above.

"It shall, also, be unlawful to put any other liquids or oils except gasoline or benzol in such receptacles theretofore used for gasoline or benzol, so long as such receptacles are so painted red and labeled "gasoline" or "benzol" as aforesaid."

"There appears to be no cases interpreting this law and we can give only an opinion of the probably holding of the courts, which is that this law was intended to cover receptacles, such as cans of all sizes and barrels, steel or otherwise, and similar containers which may be passed from hand to hand; and the law does not apply to the large underground tanks to which is attached a pump. Neither do we think a pump would be construed to be a receptacle or part thereof, requiring it to be painted red should it be attached to a gasoline or benzol tank. Therefore, we think you are within the law in your case.

DIFFICULTY IN STARTING IN WET WEATHER

Q—We have a 1918 Cole model 8-70, and when it stands over night in a garage during rainy or damp weather, we find that the next day it cannot be started. On certain occasions we have run the battery down trying to get the engine started. We have then found it necessary to tow the car for a block or so, after which it would start and run all right. In dry weather it gives us no trouble whatever. Advise what the cause of this trouble may be.—Edw. C. Fritz, Oklahoma City, Okla.

The only thing that moisture can affect on the car is the high tension circuit there being several places where any considerable amount of moisture will prevent firing of the plugs. We would therefore suggest that on the next wet morning that you wipe off the following surfaces:

First look at the ignition coil and with a dry cloth wipe all around the center or high tension terminal which connects

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department, but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

to the center of the distributor cap. Next wipe the outside of the distributor cap especially around the center terminal. Next remove the distributor cap and wipe it out on the inside as it is possible that moisture condenses on the inside of the cap due to the heat of the engine when the car had been running the previous night, that is, the condensation forms as the engine and distributor cool off.

Also wipe the porcelain or insulators of the spark plugs and we believe you will have no trouble in starting. We have personally seen cases where a car in a garage had drops of moisture like beads of sweat all over the insulators of the spark plug after a foggy night and it was necessary to wipe these off before the engine could be started.

We believe that the explanation of starting the engine by towing the car is due to the air which circulates through the radiator evaporating enough of the moisture so that spark will jump at the plug gap inside of the engine instead of leaking away through the water.

SIGNS ON THE PUBLIC HIGHWAYS

Q—Is there a law to prohibit placing signs upon the public highway, such as small fence signs, that can be tacked on posts or poles?—H. W. Leenennan, Guthrie, Ill.

The Criminal Code of Illinois, Chapter 38, paragraph No. 453, section No. 221, and division No. 9 declares it is a public nuisance "To advertise wares or occupation by painting notices of the same on, or affixing them to fences or other

private property, or on rocks or other natural objects, without the consent of the owner, or if in the highway or other public place, without permission of the proper authorities."

For violation of this Act a punishment by fine not exceeding \$100, and for a subsequent offense a fine of like amount and confinement of the person in the county jail not exceeding three months, is provided. In addition the Sheriff may abate the nuisance at the expense of the defendant.

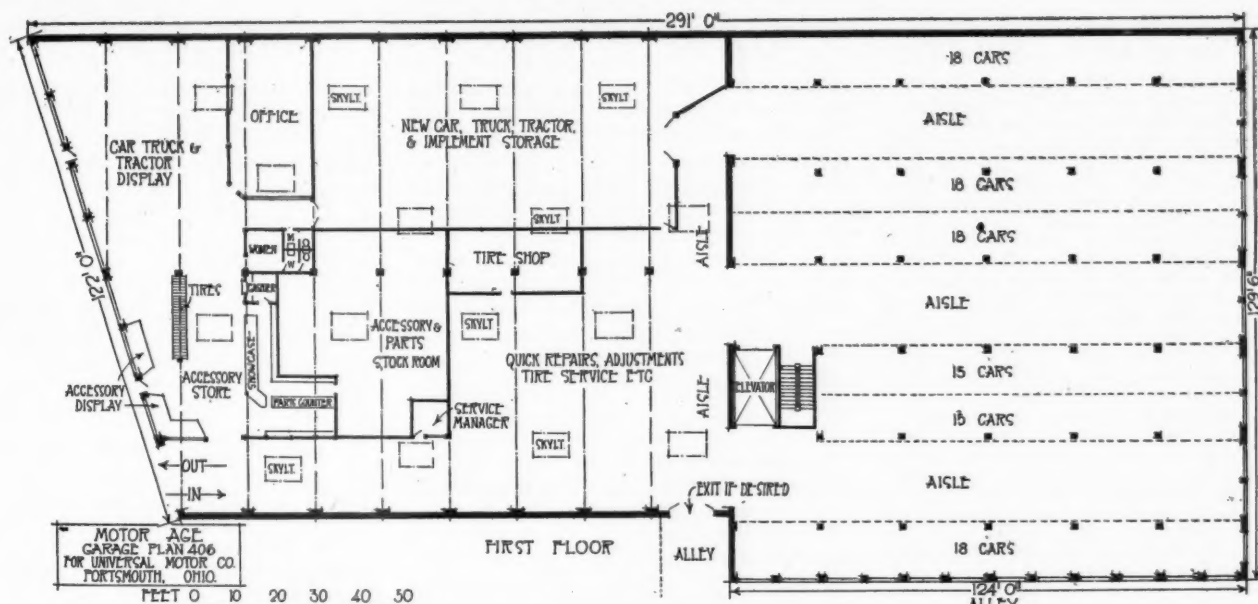
IMPORTANCE OF GOOD LUBRICATION FOR LINE SHAFTING

Q—We have a line shaft driven by a new 2 h.p. 450 r.p.m. direct drive electric motor. This motor gets very warm after running for some time, and seems to be overloaded. We previously had a 1½ h.p. 1800 r.p.m. motor which drove the line shaft by means of a belt, 4 to 1 pulleys being used. Which motor uses the most current, a 450 r.p.m. direct drive or an 1800 r.p.m. belt drive motor, and what is the cause of overheating?—Karl A. Baehr, Berlin, Wis.

There should be no difference between the power required on direct drive or on belt drive unless due to the friction of the belt; there would be slight increase in that case. We therefore think the trouble you are experiencing is due to misalignment which problem does not come up in case of the belt drive. We would first suggest that you very carefully line up the two shafts, that is, the motor shaft and the line shaft while the couplings are off.

We would further suggest that you use a flexible coupling between them, perhaps one which uses a fabric or leather disc. This type of coupling uses a flange on the line shaft and on the motor shaft and in each flange there are two pins of approximately ¾ in. diameter. In between these two metal flanges there will be used a fabric or leather disc perhaps ½ to ¾ in. thick in which will be four holes, two of which are used by the pin on the motor flange and the other two are used by the pins on the line shaft flange.

With a layout of this kind we do not believe you will have overheating as any binding action which would be due to slight misalignment will be eliminated. If the 2 h. p. motor is properly rated it should with proper connection be able to handle a greater load than the motor you previously used. It might be well to check up on the lubrication of your line shaft and turn it by hand to see that there is no undue amount of friction as the output of any motor will be absorbed to a certain extent by the line shaft, this varying from 15 to 40 per cent so that it is easy to see the importance of good lubrication under these circumstances.



The storage section of this building is designed to accommodate Ford cars only; if larger cars are stored they can be placed in one row where there are two rows of Fords

Plan for Ford Sales and Maintenance Building

PLAN NO. 406

Q—We are contemplating the erection of a new garage and would like to have any suggestions which you may offer us in the way of arrangement and construction. We intend to build a fire-proof building. We are sending you under separate cover the outline and dimensions of the lot.

It is our intention to make it one story back to the alley where the off-set of 16½ ft. sets in and two stories from there back to the rear. We expect to do some storage business and are operating a Ford agency in which we do all maintenance work and handle parts and accessories. We would greatly appreciate any advice which you can offer us about this building.—Universal Motor Co., Portsmouth, Okla.

There is not much to be said of this layout, everything being apparent. Possibly we have not left enough showroom space to display the complete Ford line of cars, trucks, tractors and implements, but this is very easily remedied by simply moving the office partition back as far as desired. In fact, the whole accessory store and stockroom section may also be moved back and still leave plenty of space behind.

You can, of course, use your discretion regarding rear exits, but with a two-way entrance in front there is really no need of any other doorway; too many exits lead to irregularities in the coming and going of cars which are undesirable in a well regulated establishment.

The lower floor of the two-story section will be dark over the most of the area and is best suited to garage use while the upper floor should house most of the repair departments. Here there may be plenty of light for good work supplied by skylights and side windows as well.

The garage is laid out for the Ford product, the spaces being rather short for larger cars, though one row of long cars could be accommodated by stealing a foot from each of the aisles. It might even be possible to arrange for two rows in this way, but it would make the quarters too cramped and would not be advisable except in an emergency. A plant of this size should take care of an enormous business if worked to its capacity.

Architectural Service

IN giving architectural advice MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among

other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

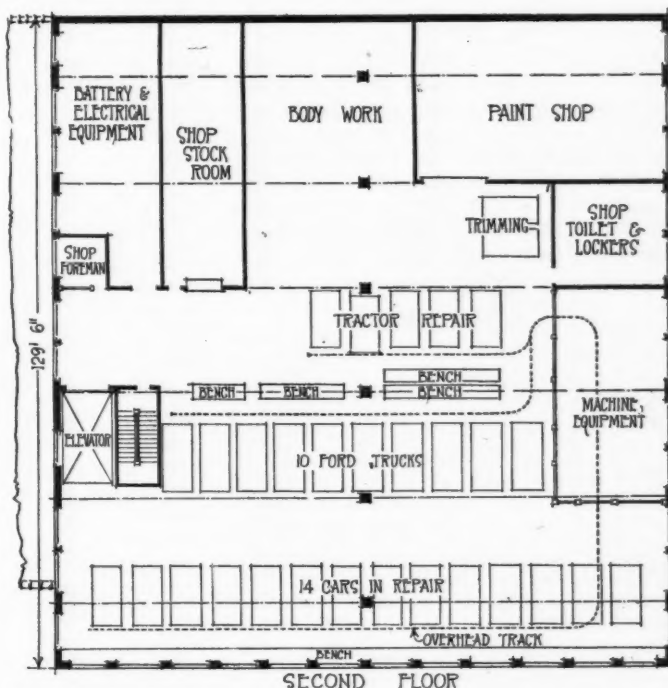
What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.



The second floor is devoted to repair operations exclusively. Quick service and tires, however, are handled on the main floor, only long jobs being sent to the second

OIL PUMP ON DODGE

Q—We are having considerable trouble with an oil pump on a 1917 Dodge. The paddles and spring in the pump seem to be all right. There are no air leaks around the flange nor are there any leaks in the oil line, but still the oil gage shows only about one pound at a speed of 20 m. p. h. Unless the oil is carried high in the crankcase the bearings soon become loose.—Geo. W. Murray, Blythe, Cal.

If you are certain that the oil pump is working correctly would advise that you increase the tension on the check valve spring. This is located in front of the engine where the oil pipe leads into upper part of crankcase. Remove this valve and pull the spring out slightly to increase its tension and then run engine and note the pressure reading. It may be possible that you will raise the pressure too high a value and it will require repeated attempts until you get the best and recommended pressure reading on the gage. If a new check valve spring is easily obtained we would advise that you install a new spring instead of stretching the old spring.

Static Discharge Dangerous—Methods for Its Neutralization

Q—Explain the cause of the following fire which was produced by electricity generated in pumping gasoline.

A mechanic was pumping gasoline from a large under ground tank into a portable tank which was mounted on wheels equipped with rubber tires. He had noticed on previous occasions that there was a strong electrical current generated and that a shock would be obtained from the small tank after it had been filled. He had also noticed that a spark would sometimes jump from the wheel over the surface of the rubber tires to ground. In this particular case the tank being filled overflowed and the gasoline ran down on the wheel and tires just as a spark occurred.

This set fire to the gasoline tank and when the insurance company came to investigate they claimed that the mechanic was smoking at the time of filling the tank. He proved to their satisfaction however that this was not the case and that the trouble was apparently due to the electricity generated. As a result of this accident one of the large oil companies in this town uses chains on the axles of its trucks, which chains drag on the ground in order to prevent accumulation of electrical charge. Give complete explanation of the above circumstance.—Wilmer Utter, St. Louis, Mo.

The exact laws governing the generating of electrical charges in pumping gasoline do not seem to be absolutely known, but the general principle seems to be similar to that involved in the generation of static electricity noticed especially in the winter time under a number of conditions. For example when combing one's hair with a rubber comb there will be a crackling sound and sparks will be seen and the static attraction will cause the hair to stand on end when the comb is held near. Another illustration is that of stroking a cat's back as the hair will also stand on end. Another illustration is the act of walking across a carpet and then touching another person or a radiator which will produce a spark. The general law seems to be that the rubbing action between insulators or insulating bodies produces a static charge on the body and that when brought in contact with other bodies or a connection to the earth that this static charge jumps off producing a spark. The gasoline being a petroleum product is an insulator and the rubber used in gasoline hose is also of an insulating character. There seems to be some question as to whether the static is generated due to the gasoline by its frictional contact with the hose or due to the fact that different drops of gasoline are rubbing on each other as the gasoline flows through the hose and into the tank.

There is possibly some truth in both of these theories. This means that either pumping gasoline into a tank or merely the gasoline washing around in the tank as the car or tank wagon is driven will generate electrical charges which may produce a dangerous spark. Several precautions seem to be taken by some of the oil companies, one being to have a complete metal connection from the ground tank through the flexible metal lining of the hose to the tank which filled.

In this case the nozzle should make a metal connection if possible with the

metallic lining of the hose and should also make connection with the tank which is being filled. In the case of an automobile being filled or in the case of a small tank above illustrated the static charges generated will flow from the metal of the tank to the nozzle and from the nozzle to the flexible metal part of the hose and back through the large grounded storage tank to the earth so that no great charge will be allowed to accumulate.

In the case above illustrated where a fire resulted there was probably used a rubber hose which had no metal liner in which case a charge of electricity was allowed to accumulate. The dragging of a chain along the ground is a precaution that is taken by a number of oil companies so that if the gasoline washing around in the tank produces a charge of any kind it can leak off to the ground through the chain without producing any appreciable spark which might cause a fire.

In straining gasoline it is sometimes run through a piece of chamolis and under these circumstances, extreme caution should be exercised, as a very heavy charge seems to be generated by this procedure.

PROPORTION OF COMPRESSION STROKE

Q—Give the proportions of the compression space in volume to the piston displacement as practiced in the modern automobile engine. Would like to know this exactly.—Harry Head, care Thunder Lake Lodge, Remer, Minn.

This information cannot be definitely given as such specifications are not supplied by the manufacturers, however, the average compression ratio of the modern automobile engine is in the neighborhood of $3\frac{1}{2}$ to 4 to 1. This would give a proportion in volume only after the cylinder bore and stroke is known. As an example let us take the engine of 4 in. bore and 5 in. stroke which is rated as having a 4 to 1 compression ratio.

We must first find the piston displacement of the one cylinder which in this

case would be approximately 63 in. As the ratio is 4 to 1 the volume of the combustion chamber would be $\frac{1}{4}$ of the total displacement which is 63 in. or 15 $\frac{3}{4}$ in. which would be the cubical inch value of the combustion chamber. You will note by this that the volume of the combustion chamber is dependent on the compression ratio and the piston displacement. So that in order to find out the value in inches of the space comprising the combustion chamber it is necessary to know the compression ratio and the bore and stroke of the cylinder.

1920 OAKLAND PUMPING OIL

Q—We have a 1920 Oakland which started to pump oil after it ran about 2,000 miles. We installed new rings and it was all right until it went about 2,000 miles farther and then again continued to pump oil. Do you think regrounding the cylinders and new pistons and rings would correct this trouble?—J. W. House, Pontiac, Mich.

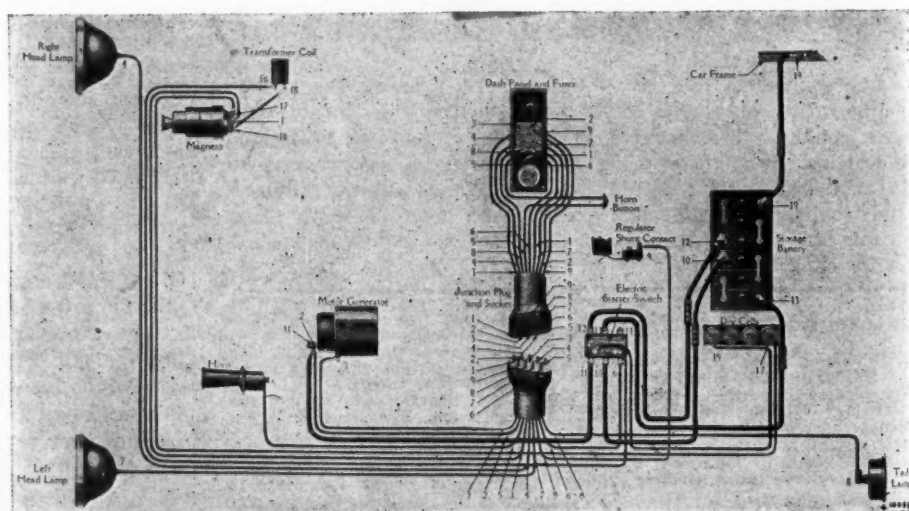
We would advise that you remove the cylinder block from this engine and carefully micrometer the cylinders. If the cylinders are round, that is, truly circular and show no variation greater than .0015 to .002 they will not require regrounding. If the cylinders require regrounding we would advise that you install the new style Oakland pistons as used as factory equipment and the 1922 model of rings.

We have been informed by the Oakland company that the installation of the 1922 model piston rings on any of the Oakland engines built previous to 1922 will entirely eliminate the oil pumping to which they were subject. The name of the piston ring used on the 1922 Oakland is called the Panyard and can be secured either from the Oakland dealers or from the Panyard Piston Ring Co., Chicago, direct.

WIRING DIAGRAM OF 1916 MAXWELL

Q—Publish diagram showing the wiring of a 1916 Maxwell.—Herrin Auto Co., Herrin, Ill.

Diagram requested is shown below.



Wiring Diagram of 1916 Maxwell

REBUILDING BURNED CAR INTO SPORT SPEEDSTER

Q—We are contemplating the purchase of a Buick Six roadster, Model 1920, and converting it into a sport speedster, and would like to have your advice on some few things. The car mentioned burned about a month ago. The engine is unhurt by fire and is intact except carbureter, which is missing, presumably by theft. Radiator, hood, frame, springs, starter, generator, steering apparatus and drive shaft seem to be in first class condition. Rear axles and differential gears missing by theft. Right rear wheel burned slightly, left rear wheel completely destroyed. Both front wheels in first class condition.

New Carbureter

1—Will you name a substantial medium priced speed carbureter?

1—A Marvel carbureter which is regular equipment could be used with satisfactory results on this car. However, if you wish to secure the maximum speed, you probably will use a larger manifold, which will mean a larger size carbureter, which could be either a Marvel or any other standard make.

Iron for Body

2—What gage iron should be used for body?

2—Metal should not be heavier than 20 gage, although some raceabout bodies, where weight is not considered at all, use 18 gage metal.

Iron for Enamel Finish

3—Which will take an enamel finish the better, galvanized or black iron?

3—Terne plate is a metal generally used for the construction of automobile bodies. It will take at least as good a finish as either black iron or galvanized iron. It can also be very easily worked. Generally speaking, black iron will take a better finish.

New Rear End

4—Can I substitute a complete rear end of another make for the one now installed? Name one which will give more speed.

4—It is possible to install another rear end, but changes of this sort will run up into considerable money, and we would not advise such an operation.

Some Suggestions

5—Will it be convenient to supply helpful suggestions in the building of this car for speed?—Leslie Russel, Vernon, Tex.

5—In the way of suggestions, we are reprinting a letter received from Scotty Ellsworth of Eagle Grove, Iowa, as follows:

"Being a reader of the Clearing House, I noticed Mr. Guilden of Chattanooga asks how to build over a Buick D 45. Having built over one that was very fast, I will describe it and maybe give him a few pointers.

"To commence with, we stripped off the body and discarded it entirely. We next shortened the frame to make the wheelbase 100 inches. This will necessitate shortening the drive shaft and housing. Any good machinist can do that. In shortening the frame, the rear spring hangers can be set ahead, and by taking the rear frame member out, vee the ends that stick out and bring the two ends together and weld. This will stiffen the frame and leave a spare wheel carrier.

The position of the steering gear will have to be changed, but that is not a hard matter to do.

"The engine is the next item. I entirely discarded the old block and put on a model K block. This block has much better valve ports, and the new type Buick valves do not stick or warp as easily as the old type with small stems. I used the latest type rocker arms. With this combination, you will find that you have a valve lift of nearly 7/16 of an inch, a good advantage. This is due to the fact that Buick changed the lift of the new style cam and increased the rocker arm ratio to eliminate noise, and it is just what you desire for speed.

"You will find in the early 45 that the connecting rods are very heavy, but in the latest ones they are changed and are very light. Use these rods and they will need very little lightening.

"But in making the change from 3 1/4 to 3 3/8 pistons you will find that the pins are stationary in the 45 D rods and they turn in the later Buick models, but are the same size.

"Now the special light pistons (I used DeLuxe), do not have bosses enough to turn the pin in so we will have to look for a replacement piston. After a little research I discovered that the piston manufactured for the Overland light four would answer the purpose, as these are 3 3/8 in. in diameter and the pin turns in the bosses. There is a difference of about 1/8 in. above the piston pin and this means too much compression so I had to make a spacer and put on the bottom of the block, in order to raise the block up. I was also afraid the piston would go too far up in the compression chamber.

"For timing we advanced the cam one tooth and this gave good results.

"You will find that this block cools lots better than the old one and it is a good plan to use a new style radiator as it has more capacity.

"For carburetion it is best to use the biggest aluminum manifold that is made for this model and a Miller or Master carbureter to fit it. There were two styles of manifolds made for this model.

"For ignition I used a Bosch high tension and in order to do that discarded the generator outfit and made an L shaped shelf shaft for the magneto to set on. You will have to make a special pump shaft, that is longer, and install regular magneto coupling. Regular A C Buick plugs work good.

"In the rear axle the 13 to 53 will work the best on a half mile track but 14 to 53 will make more speed on a straight way. You will use 32 x 4 wire wheels and I like the high ratio the best.

"The oiling system will not need much attention other than an auxiliary tank in the rear and a driver's pump. If you happen to have a late D with the tin case you can use the new type pressure pump and have the pressure gage on the dash.

"Of course, a special body will have to be built and the clutch and brake pedals will have to be put in front of the left engine leg as on the Paige 6-42.

You will use pressure gasoline feed and I mounted the tank back of the seats.

"This chassis is very low to the ground and will not need much attention along those lines.

"This engine if the work is carefully done will turn over better than three thousand a minute and have a get away that is great. The combination of valves and block will eliminate buying a special cam as 7/16 is quite a lift.

"The foregoing notes are actual experience and will make a fast engine from a lazy one and you will find this car a dandy for service and stability."

SPEEDWAY AND BEACH STOCK CAR RECORDS

Q—Tell me what is the fastest stock car manufactured in the U. S., based on the piston displacement and gear ratio.—R. P. Fisk, World Tire Store, Florence, Ala.

1—Considering the speed records of any automobile, the gear ratio is not taken into consideration, as the most efficient gear ratio depends entirely on the type of engine used; that is, a very high speed engine will use a very high reduction in order to secure its highest efficiency, where a low speed engine will use a low reduction by the same reasoning. American Automobile Speedway records in Class B stock chassis for 5 miles to 100 miles are held by the Paige, driven by Mulford, at Uniontown, Pa., on May 20, 1921. This Class B specifications require the engine to be not more than 450 in. displacement. Mulford's time for the various distances were as follows:

| | |
|----------------|-----------------------------|
| 5 miles..... | 3 min. 15 88/100 sec. |
| 10 miles..... | 6 min. 31 48/100 sec. |
| 15 miles..... | 9 min. 45 96/100 sec. |
| 20 miles..... | 13 min. 1 48/100 sec. |
| 25 miles..... | 16 min. 37 94/100 sec. |
| 50 miles..... | 33 min. 16 43/100 sec. |
| 75 miles..... | 50 min. 80/100 sec. |
| 100 miles..... | 1 hr. 6 min. 53 26/100 sec. |

Straightaway records, Class B stock chassis, 300 to 450 cu. in., are held by L. F. Goodspeed in a Roamer, made at Daytona on April 22, 1921. The time was as follows:

| | |
|--------------|-----------------------|
| 1 mile..... | 34 25/100 sec. |
| 2 miles..... | 1 min. 8 86/100 sec. |
| 3 miles..... | 1 min. 43 69/100 sec. |
| 4 miles..... | 2 min. 18 8/100 sec. |
| 5 miles..... | 2 min. 53 48/100 sec. |

We would advise that if this data does not answer your question, that you advise us a little more clearly as to just what information you desire.

CROW-ELKHART CHARGING RATE

Q—Advise how to increase the charging rate on a dyneto generator installed on a model K Crow-Elkhart car.—J. E. Frankie, High Bridge, Wis.

1—The regulation on this generator is by means of third brush. To change the third brush adjustment remove a leather plug on the end bracket near the fuse. After the leather plug is removed it is possible with a screw driver to loosen the clamping screw and then the third brush can be shifted by pushing it one way or the other. To increase the output or charging rate this brush should be moved in the direction of rotation. After the proper charging rate has been obtained the clamping screw should again be tightened and the leather plug replaced.

Collection of Diversified Questions

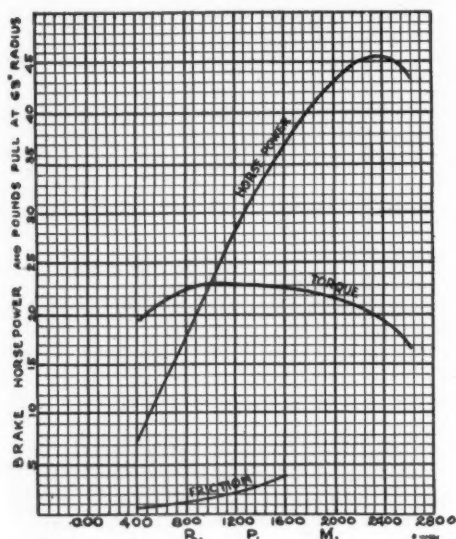
Q—Publish illustration showing transmission and clutch assembly of a Paige Six 38, 1916.

1—A view of the transmission is not available, but we would state that a picture of the clutch used on this car has been shown repeatedly in MOTOR AGE, as this is a Borg & Beck dry plate clutch.

Power Curve of Rutenber Engine

2—Give power curve of Rutenber engine used in this car. How many sizes does this company make?

2—Power curve of this engine is shown below. This company lists only one model of engine at the present time.



Paige Records

3—What records does the Paige Six 66 hold for power and speed?

3—The Paige 6-66 in stock chassis Class B holds speedway records, non-competitive, from 5 miles to 100 miles. These records were made at Uniontown, Pa., on May 20, 1921, by Ralph Mulford.

The Knight Engine

4—Give reasons why the Knight engine is not used more than it is.

4—The cost element is perhaps one great factor in retarding the more widespread use of the Knight engine. Added to the cost of production of a Knight engine, is extra royalty charge, which is necessary in order to secure manufacturing rights. The improvements in the poppet valve engine in the past few years have been such that they have overcome some of the talking points for the Knight engine which were directed against the poppet valve engine. However, the Knight engine still holds an enviable record for reliability and long mileage without any great upkeep cost.

Knight Engine in Airplane

5—Was this type engine used in any airplane and with what results?

5—We have never heard of any instance where this type of engine was used in an airplane.

Piston Displacement and Fuel Consumption

6—Would an eight-cylinder car of 360 in. piston displacement use any more gas

than a four-cylinder of the same displacement?

6—This is a question that absolutely cannot be answered definitely, because it takes in so very many factors that it would be impossible to arrive at any accurate decision. Gas consumption is not dependent on the number of cylinders of any engine, but on the facilities for the gasoline utilization. The true measure of the efficiency of any engine is its gasoline consumption per brake h. p. hour. There are arguments as to the relative economy of an eight-cylinder vs. a four-cylinder engine of the same displacement, but, as before stated, it involves too many factors to discuss in these columns. The effects of volumetric efficiency, thermal efficiency, carburetion, compression ratio, mechanical losses are all wound up in the discussion, and would state that no engine should be judged by its number of cylinders or its piston displacement when it comes to gasoline consumption, but rather on its consumption of fuel per brake h. p. hour on the dynamometer.

The Four-Speed Transmission

7—Why is it that so few cars use a four-speed transmission?

7—There are several angles connected with this question. In France and Great Britain, among the small cars, the four-speed transmission is found in great numbers. On the continent and in Great Britain the cars are taxed according to the treasury rating on the h.p. of the engine. The h.p. is derived from the bore and stroke of the engine, and in order to enable the owner to have a car that will perform, it is necessary to build a small bore engine of very high speed, which requires that an additional gear be utilized in order to secure efficient operation of the engine at low car speed. The roads, generally speaking, on the Continent are much better than American roads, and with an overgeared four-speed it is possible to secure greater efficiency from the engine in the matter of gasoline economy than without such a drive. The use of four-speed transmissions then, we might say, is usually associated with a chassis wherein the utmost flexibility is desired from a given size engine. The four-speed transmission shows a slight loss even in Great Britain among the higher powered cars, where a fourth speed is unnecessary. In America the four-speed transmission is found only on the high priced cars, where it is used as a means of securing gasoline economy rather than flexibility of performance.

Speeds of Various Cars

8—Give approximate speed of the following cars: Oldsmobile eight, Hudson super sport, Paige Six 38, Stephens, Stutz, Cadillac and Rolls Royce.

8—Oldsmobile 8, about 65 m.p.h. The approximate maximum speed of Hudson Super Six sport model, 70 to 75 m.p.h. Paige 6-38, 55 m.p.h. Stephens, 70 m.p.h. Stutz, 70 to 75 m.p.h. Cadillac, 70 m.p.h. Rolls Royce, 70 to 75 m.p.h.

Largest Mileage on Record

9—What is the largest mileage any one car has to its credit?

9—There are no accurate records regarding mileage. It is safe to assume that there are many cars operating today that have over 300,000 miles to their credit. We recall some eight years ago when a Buick was awarded first prize as being the Buick which covered the greatest number of miles, and at that time the car had covered nearly 200,000 miles. No doubt some of the old Renault taxicabs and various American makes of cars running in the city of New York have mileages that would run way above the 250,000 mark.

Oversize Valves for Paige

10—Where can I secure oversized valve tappets and valve springs for a Paige Six 38, 1916?

10—We know of no firm outside of the Rutenber or Paige companies that can supply the articles mentioned in this question.

"Pepping Up" Gasoline

11—What can be added to gasoline to give it more pep?—Alfred F. Gurnett, Fairfax, Ia.

11—We know of nothing that will give any additional pep to gasoline if it is good gasoline. There are various compounds on the market which have some beneficial effect on eliminating what is known as the fuel knock on the high compression engine, but to date nothing has ever been perfected that will give any added power or pep to gasoline. If you refer to the various blends or grades of gasoline, we would state that there are certain engine fuels which are of better quality than the present-day gasoline and which will show a gain in both power and speed.

STRANGE CASE OF OVERHEATING

Q—What causes a model 490 Chevrolet engine to overheat? We have checked up the radiator, radiator connections, water pump, fan belt, oil pump, oil pipes, valves, valve timing, spark and carburetor, and everything appears to be in good condition. The brakes do not drag and the car will make from 20 to 28 miles to gallon of gasoline, having a gravity of 62 to 63. Mobile Oil A and Arctic is used and crankcase is drained every 300 to 500 miles.—Edison W. Bennett, Pawnee, Okla.

Although you state you have carefully checked over the radiator we are inclined to believe that perhaps the radiator is full of scale or some foreign matter that prevents its highest efficiency. If possible we would advise that you secure another radiator from a 490 Chevrolet that you know positively is in good condition and install this on the 490 which is overheating.

If this eliminates the overheating it is conclusive proof that the trouble lies in the radiator. If you cannot secure a good radiator for trial we would recommend that you have the present radiator very thoroughly boiled out in some of the patented cleaning solutions used by radiator repair shops. This seems to be a very unusual case and we invite the readers of MOTOR AGE to offer any suggestions and would also appreciate being informed as to the results of the suggestion offered here.

CANNOT INSTALL AMMETER ON 1915 DODGE

Q—Is it possible to install an ammeter on a 1915 Dodge with North-East starter so that the heavy starter current does not go through it?—Reimer & Rohm Co., Alsen, North Dakota.

1—It is not possible to install an ammeter on the 1915 Dodge without getting into the generator and changing its construction somewhat. At the commutator end of the motor generator is a combination cutout and regulator and to this regulator a lead comes from one of the brushes and connects to the stationary contact of the cutout. It would be possible to cut this lead, bore two holes through the generator at some convenient place and bring out two wires which could be connected to an ammeter so as to put the ammeter in series with the leads from brush to the lower contact cutout. This would give the current output of the motor generator increased slightly by the field current. We would not suggest making a change of this kind, however, unless it could be done by a very capable electrical man.

REMOVING LIME DEPOSITS FROM RADIATOR

Q—Advise formula for removing lime deposits from radiator and water jacket on a 48-B-4 Pierce-Arrow.—Fred McNary, Martinsville, Ill.

To date we have heard of no formula that will absolutely remove a lime deposit. Dipping the radiator in a bath of muriatic acid compound of one part by volume of commercial acid (BE) nine parts of water following a rinse after the cleaning in Oakite platers cleaner. The straight commercial acid is sometimes used, but in any event this procedure must be carefully watched to prevent damage to the radiator itself. One way recommended by the Oakite Co. in cases where the deposit is not obstinate is to put into the radiator 1 to 1½ lbs. of Oakite or Oakite platers solution and start car with the fan disconnected. When the solution has heated up, connect fan and run as usual. Running the car a day or so should dislodge the deposit in any but the most obstinate cases. Drain and refill with clean water. The method wherein the acid solution was recommended should not be used unless in the hands of a competent repair man who is well equipped to do this work.

MORE POWER FOR PEERLESS

Q—We have a 1917 Peerless eight and the engine does not have the power it should have. It is equipped with a Ball & Ball carburetor. At most speeds it will hit on all eight cylinders also when on a pull but when running at about 15 m. p. h. it misses. We have gone over the ignition carefully and had the carburetor apart but cannot overcome this missing at that one speed. Give us your opinion as to the trouble and how to remedy it.—Standard Repair Shop, Dover, Ohio.

As this trouble seems to be quite strange we would advise that you first check over every item carefully starting in on the timing of the valves and the ignition. After checking the valves and ignition timing inspect the tappet setting on each of the valves. The tappets

should be set not less than .003. Examine the butterfly shaft in the Ball & Ball carburetor to see whether there is excessive play between the shaft and the carburetor housing. Oftentimes if there is over 1/32 in. of clearance it will allow the admission of too much air which will give a very erratic mixture. Of course the thing to do before any real work can be done on this car is to locate just what cylinders are missing. This can be done by either opening the release cocks or by the use of a screwdriver or other instrument to ground the plugs when the engine is operated at certain speeds. In connection with the ignition system we would advise that you examine very thoroughly the secondary cables where they go through the metal tubing on top of engine. Not infrequently the insulation becomes cracked or leaky and the spark will jump to the metallic tube instead of to the plug. As before stated first determine in what cylinder the missing is occurring and then use a common sense process of elimination to locate the cause of the missing.

LINCOLN ENGINE FIRING ANGLE

Q—At what degree does the Lincoln engine fire? At what degree are the cranks on crankshaft set?—J. E. Butler, Little Rock, Ark.

The Lincoln engine is a 60 degree eight. On an eight-cylinder engine of the four-cycle type, four cylinders will fire once during every revolution of the crankshaft. If the engine was a 90 degree type, each explosion would occur at equal intervals of 90 degrees, but on the 60 degree type the four explosions, although they are divided into one revolution of the crankshaft, are divided differently. The two cylinders, that is, one cylinder on each bank will be within the 180 deg. interval. One cylinder fires at 60 degs., and the next cylinder 120 degs. later. The cranks are set at the conventional angle of 180 degrees, the two end pins and the two center pins being in the same place.

KNOCK IN OVERLAND 85-4

Q—We have an Overland model 85-4 that has just been reground and new pistons installed and all bearings taken up and new wrist pins and bushings installed, but still we have a knock similar to a carbon knock which occurs only at idling speeds. By shorting No. 1 spark plug the knock is eliminated. Advise what causes this knock and how to remove it.—H. W. Straub, Tiffin, Ohio.

The symptoms described in this engine point to a piston slap. We would advise that you remove the bottom part of the crankcase and the cylinder head and before the piston is removed revolve the crankshaft very slowly at the same time observing if the action of the connecting rod shows any tendency to strike the boss of the piston or whether it has any movements back or forth across the piston pin. If such is the case it indicates that the connecting rod is bent and this may be the cause of the knock. If the connecting rod is perfectly straight and piston pin has sufficient clearance so that it will not cut the cylinder we would advise that you remove the piston from the cylinder and micrometer both

the cylinder and the outside diameter of the piston. Compare the diameter of the No. 1 piston with the diameter of No. 2 or 3 piston which you know are not knocking and if the No. 1 piston shows a variation of more than .002 or .003 diameter it is quite conclusive that the piston is slapping. However, it will be necessary to micrometer the No. 1 cylinder as No. 1 cylinder may be slightly smaller than the No. 2, 3 and 4 cylinders. It may also be worth while to note whether the top of the piston on No. 1 cylinder interferes in any way with the cylinder head gasket.

VARIETY OF QUESTIONS

Q—At which speed in high gear do the points on the cutout supply current to battery? The car is a Scripps Booth 8-D, 1918.

1—Relay should close at 8 to 10 m. p. h. and open at 6 to 8 m. p. h. The gap between relay contacts should be .012 to .015 inches. Air gap between relay armature moving member and coil core should be .012 to .015 in. The spark should be set on full retard position when the piston is on the upper dead center, firing stroke.

2—How do you set ignition timing with Remy automatic advance?

2—An automatic advance is set in exactly the same way as you would a manual advance.

3—Advise timing of valves in degrees.

3—Valve timing in degrees is marked on the flywheel of the engine. It should correspond to the following; intake opens 16 degs. after upper dead center, intake closes 52 degs. after lower dead center. Exhaust opens 40 degs. before bottom center and closes 16 degs. after upper dead center. It will thus be seen that the intake opening and exhaust closing are practically simultaneous.

4—What is the correct oil pressure?

4—This is not known.

5—What r. p. m. is the engine supposed to turn up?

5—This engine developed its maximum h. p. in the neighborhood of 300 r. p. m. and it should turn from 3000 to 3200 revolutions maximum.

6—What is the highest speed this car is stated to make?—Robert R. Bull, Ocean View, Va.

6—A high maximum speed of approximately 65 m. p. h. should be secured from this car.

1916 CADILLAC FAN SHAFT

Q—We have had trouble with a 1916 Cadillac fan shaft not staying adjusted and developing end play. We have set the shaft up twice with new bearings and each time after two hours running of the engine the fan shaft becomes loose.—McArthur & Hindley, Blythe, Calif.

This trouble is probably due to the fact that the engine in this car is equipped with a small fan shaft bearing. The Cadillac cars carrying serial No. 28,000 to 35,000 inclusive carried large ball bearings for the fan shaft, while all others built during that year had the smaller bearings. If you will go to the Cadillac Official Service Station and secure the larger type of bearing for this shaft the trouble will be removed permanently.

1919 Chandler Questions

Q—Advise how to time a 1919 Chandler with Bosch magneto.

1—To set the engine on dead center it is well to remove all of the spark plugs except the one in the front or number one cylinder. The engine can then be turned over by hand until the compression is felt. The number one spark plug can then be removed and the engine turned over until the piston is at top dead center. This position can also be checked by observing the very last valve away from the radiator as this will be the number six exhaust valve.

If a piece of paper is slipped in between the valve stem and the valve tappet it will be pinched as the valve is raised from its seat and will just barely be released as the valve again comes down on the seat. This will happen just a few degrees after the number one cylinder gets on dead center, and is a fairly good way of checking the firing position, as it will not give the exact dead center but a few degrees late so that the engine will be perfectly safe to crank with the spark fully retarded.

After the engine has been set on dead center the magneto should be turned until the distributor brush is under the high tension terminal that you wish to use for the number one spark plug wire. The steering column spark lever should be retarded and the interrupter housing on the magneto will then also be retarded that is, moved with the direction of rotation. The setting of the distributor brush as above indicated gives the approximate position of the magneto and it should now be more carefully checked by carefully watching the interrupter points as these should just be ready to open when turning the magneto in a normal driving direction at the same instant that the engine is on dead center. It is satisfactory to have the fibre bumper on the magneto interrupter just making contact with the crescent shaped cam as this indicates that the interrupter points are just ready to break. With the engine properly set, and the magneto also properly set the two should be coupled together which will give the correct timing.

Firing Order

2—What is the firing order on this car?

2—The firing order on the 1919 Chandler is 1-5-3-6-2-4, but in any case where you are not certain as to the firing order it can be checked up by watching the exhaust valves only. These can be determined by looking at the exhaust manifold to see where it connects to the cylinders as the valves in line with these ports or extensions of the manifold will be exhaust valves.

If the engine is now turned over slowly by hand it is easy to watch the valves and see which one comes up after number one, then which valve is third to rise and so on, and in this way you will be able to find the firing order in case it is not known.

Correct Valve Clearance

3—What is the correct amount of valve clearance?

3—The clearance between the valve stem and the valve tappets should be approximately .003 in.

Installing a Parking Light

4—In adding a parking light or spot light to this car is it correct to connect to the line side of the ammeter?

4—In installing a parking light or spot light one lead can be connected to ground that is the frame of the car or the engine and the other lead may be connected to the live terminal on the back of the lighting switch. This terminal on most cars is marked "C" or if not known can be found with the switch turned off by using a test lamp or the regular lamp which you are about to install connected from ground to the various terminals and the one at which it lights up is the one to which permanent connection should be made. This of course is assuming that the parking light or spot light has a separate switch in its own circuit.

Figuring Proper Wire Size

5—What is the formula for figuring the correct size wire to use on different circuits on a motor car?—Wm. Dowling, Covington, Ky.

5—The size of wire to use is usually determined by the amount of voltage that would be lost and this is always the resistance of the wire multiplied by the current it is carrying. For example No. 10 wire has a resistance of 1 ohm in 1,000 ft. and if we assume that the 10 feet of No. 10 wire should be used in a circuit then the resistance would be .01 ohm for this circuit.

If we had this circuit carrying 10 amperes we would multiply the 10 amperes by the .01 ohm which would give us .1 volt lost, so that if we started with six volts at the battery we would have 5.9 volts at the light. However, if we were using wire of this kind for a tail light circuit which only drew 2 amps. it would be unnecessarily heavy.

For practical purposes these problems are not worked out exactly but No. 10 wire is used for currents of 8 or 10 amperes and No. 14 wire is used for tail lamps, side lamp and ignition circuit and various places where the current is under 5 amps. The amount of voltage lost under these circumstances being practically negligible.

Welding Torch Takes Fire

Q—Our welding torch, for some unknown reason, took fire in the oxygen chamber and a hole was burned through the side. Give us all the information possible you can regarding this accident.—Mohave Garage, Kingman, Ariz.

Flash-backs or backfiring of the torch are more or less frequent occurrences depending on the type of torch used and upon local conditions. In some types of welding torch this condition is due to the design of the torch itself and the principles under which it operates. A good torch however, should be so designed that backfiring or burning of the gas back of the torch is confined near the torch tip.

If the pressure of the acetylene is too low or if the hole in the tip is obstruct-

ed by dirt, or the tip is excessively overheated, the flame will pass back into the torch. In nearly all cases it is due to the operator not having sufficient acetylene pressure turned on at the regulator.

The remedy is to use the proper pressure recommended by the manufacturer for that size of tip. When a backfire occurs immediately turn off the oxygen at the torch valve and the gas will relight outside of the tip. If it does not relight turn off the acetylene, examine the tip, clean it if necessary and relight.

Backfiring will cause burning at the point where the gas and oxygen meet and are mixed. In some torches the gases are mixed just inside of the end of the tip while in other designs this is done farther back in the torch. If the torch was shut off immediately after the back fire there is no reason for the torch to have burned through.

The oxygen should be shut off immediately upon the back fire occurring and if the torch does not relight the acetylene should be shut off and the tip examined as stated before. If the torch continues to burn after the torch valves have been closed it shows that the valves are not seating properly.

Graphite on Ford Transmission

Q—We would like information as to the advisability of using graphite on Ford transmission bands to stop grabbing, as there is some question as to whether this will short the windings in the magneto sufficiently to cause trouble. We have been advised by one mechanic that putting two or three teaspoonsful of powdered graphite directly on the drum through the inspection cover and then running the engine for a short while gives good results.

He further recommends that the oil be then drained and the transmission washed out with kerosene which is again drained and the engine filled with fresh oil. This mechanic claims that the grabbing action is stopped through this treatment and that there is not enough graphite left in the transmission to affect the magneto. Advise us if this is so or if some harmful action might result.—Fox Garage, Cedar Rapids, Ia.

We are of the opinion that the amount of graphite left in the transmission with the treatment above described would not be enough to cause any trouble. Graphite is of the same general composition as the carbon or soot which is deposited on spark plug porcelains by the burning oil and we have all seen engines that were running very well in spite of the fact that the porcelain had a considerable coat of graphite.

When it is considered that the spark plug carbon is a leakage path for current under a pressure of 4,000 or 5,000 volts while the magneto voltage is only 26 or less it is apparent that graphite in limited quantities would not be likely to cause serious results, although no doubt if the transmission should be flooded or packed full of graphite that enough might accumulate around the terminal to short out the magneto. While we have not seen this method used we do not see but what it would be well worth trying out.

Description of Wisconsin State Champion Racer

Q—Give me the general specifications of Grover Horn's Ford that won the Championship of Wisconsin 1921—Arnold C. Gunderson, Minneapolis, Minn.

1—We are printing herewith letter received from Grover Horn, builder of the Champion Ford of the state of Wisconsin. "I will try to answer your letter of December 28, in regard to the specifications of Ford Champion No. 10, but I am afraid that I am going to make a jumbled up mess of it for the reason that as a letter writer I am a very good butcher. However, here goes, and if there is anything that I have missed let me know and I will be more than glad to add it, as I have gotten some good ideas from your columns.

First of all I would like to say that no special effort was made to keep this job light, and the result is a car that weighs 1340 pounds, partly tanked up. About 300 pounds could be saved if the job were built to save weight, but when I started to build this I had no idea that it would turn out so fast. On the transmission alone about 50 pounds could be saved by using an aluminum case which can be had from the manufacturer of this transmission. The magnets could be left out of the car and in many places weight could be saved.

Wheelbase is 102 in. and Frame is Underslung

The wheelbase is 102 in. The underslinging parts used are the standard parts furnished by Morton & Brett which consist of extra tips for the old style radius rods in front which move the front axle 2 or 2½ in. forward. A spring in front hangs on bronze hangers which in turn hang on the extension tips of radius rods bringing the front spring down in behind the front axle. Nothing is changed on the front end of the frame assembly. The rear axle housing is taken apart and housings turned end for end which brings the housing upside-down from what it originally is. This brings the spring perches or hangers on the bottom instead of on top. These are then turned around so they are close to the housing instead of away from it.

The bushings are then driven out and a fitting which comes with the outfit goes through the hole and extends forward where it is bent up and riveted to the rear radius rod about 10 in. ahead of the housing. On this fitting is carried a bronze hanger which in turn carries one end of the rear spring bringing the rear spring forward and below the housing (that is the ends are below the housing but the spring is still above the axle and propeller shaft housing.) This installation saves cutting the propeller shaft housing or the shaft and in case of breakage a standard Ford part will fit to make repairs. The body is a stand-

ard Morton & Brett speedway type with the exception of the hood which came out second best after two crashes through fences before the driver realized that the car was really fast, therefore we had to make a new hood for it.

Claims Speed of Better Than 75 Miles Per Hour

The actual speed of this car I cannot give you as it is equipped with only a 75-mile Stewart-Warner speedometer and after this instrument is put against the pin the car seems to have quite a bit left in it, just how much I would not try to say but I would like to say this, testing the job out on a mile track and holding the car as nearly as possible on just 60 the stop watch will always check between 58 and 59 seconds. The car has done a mile on a 1-mile track in 55 seconds and half mile track in 34 seconds. This is not a record by any means but it is moving right along.

The gear ratio is Ford standard (car is too heavy for higher ratio as I have tried it). Crankshaft is Ford and it was carefully balanced alone and again balanced after the flywheel was put on. The connecting rods are the new style Ford rods which are quite light. These are very carefully balanced, stock removed from the surface but not drilled as is sometimes done. Too much care cannot be used on the rods as the more carefully these are balanced the better the job will run, that is in regards to eliminating vibration. The pistons on this car are the new Dowmetal which are lighter than the aluminum and non-scoring, obtained from the Dow Chemical Co.

We use Miles piston rings, only two on a piston. The wristpins are standard Ford carefully matched in regard to equal weight. The engine is equipped with a Roof 16-valve high speed cylinder head type B. B. obtained from Laurel Motors Corp. The valves in this job are the Ampco obtained from American Metal Products Co. Eisemann magneto high tension used with standard fittings furnished by the Eisemann Magneto Co. to fit Ford old style. It has standard shape Ford radiator, fitted with a semi-honey-comb type core under regular Morton & Brett radiator shell.

Shock Absorbers Stabilize Car at High Speeds

Disbrow spark plugs and Perfection water pump are used. Regular Ford oil tube was left in the engine, in addition there are extra oil leads tapped into the engine, one in front at about where No. 1 travels and one just between No. 1 and 2 cylinders.

The oil and gas tanks are hung below the frame, that is the top of the tanks is just below the top of the frame. The gas tank is 7 in. deep and the oil tank is 4 in. deep. These tanks are shaped so

that they will fit inside of the frame and just clear the propeller housing and are brought somewhat to a point in front so they clear where the rear radius rods come to the third member or propeller shaft housing. Gasoline is forced up to the carburetor by pressure from hand pump mounted on the dash. Oil is pumped from tank to engine by large hand pump also hung on the dash or rather on the instrument board.

The car has a worm steering gear, wire wheels and uses the Cronk Simplex sliding gear transmission.

The car is fitted with large sized Hartford shock absorbers which make the job very steady at high speed. Before these were put on it was almost impossible to hold the car at 55 m. p. h. now the hands can be taken off the wheel at almost any speed the car is capable of doing.—Grover Horn.

NOT ADVISABLE TO INSTALL CHEVROLET AXLE IN GRANT SIX

Q—Advise whether we could install a spiral master gear and pinion in the rear axle of a Grant Six 1917 model K.

1—It is possible to install a spiral bevel gear in the axle of the 1917 model K Grant Six. The axle for this car was manufactured by the Peru Auto Parts Manufacturing Co., Peru, Ind., and we would advise that you communicate with this firm if you wish to make the change outlined. The gear ratio of the axle installed in the Grant car for 1917 was 4.50 to 1.

2—Would it be possible to use an F. B. 40 Chevrolet rear end in substitution thereof? This rear end includes the housing and gears. Inform us of the gear ratio of the Chevrolet rear end?—Eastern Auto Supply Co., Weehawken, N. J.

2—It will require some machine work to make possible the installation of the F. B. Chevrolet axle. We would not advise that you commence operations on the installation of this axle until you have an axle on the job where you can make the measurements which are necessary before any actual machine work should be undertaken. The gear ratio of the F. B. 40 Chevrolet is 3.96 to 1. This would mean that the power of the car would be decreased considerably although if driven over level country the speed would naturally be increased at the sacrifice of the power.

REMOVING FORD SPRING PERCHES

It will be found, when putting shock absorbers on a Ford car or removing front spring perches for rebushing, that the spring perches are a tight fit in the axle. A simple means for their removal consists in taking off the nut and placing a jack under the end of the perch, first interposing a lead or wooden block to save the threads. The car is then raised until the wheel is clear of the ground, and the axle is struck several sharp blows with a heavy hammer. This will instantly loosen the rusted part.

Knock Below 25 M. P. H.

1—We are having a rattle in an Overland 4, 1920 that sounds like a Ford running with the babbitt of one connecting rod at all speeds below 25 m. p. h. but runs smooth above this speed. We adjusted main and connecting rod bearings but did no good. We did not have the pistons out.

1—It is probable that this car has a loose wrist pin or the engine has developed a piston slap. Remove the piston and micrometer the cylinder and piston and note whether the clearance is greater than five to six thousandths. If there is more than .006 clearance the probability is that the pistons are slapping. When the piston is removed the wrist piston pin should be examined for wear.

Slow Acceleration

2—1917 Dord with Carter carburetor will throttle down very low but at times will not pick up when foot pedal is pressed quickly. Print a diagram of this carburetor showing all gas passages.

2—We have no illustration of this carburetor wherein the gas passages are shown. If the ignition is in perfect condition we would advise that you adjust the acceleration adjustment on the carburetor. The adjustment for acceleration or get-away is made by the small knurled button on top of the glass float chamber which governs the amount of gas supplied for the get-away only. If mixture is too rich on get-away turn this button toward letter L. If the mixture is too lean on get-away turn toward letter H. This adjustment is not to be used to regulate the idle engine speed.

Bulck Clutch Adjustment

3—Is there any adjustment on the disk clutch of a K-45 Buick?

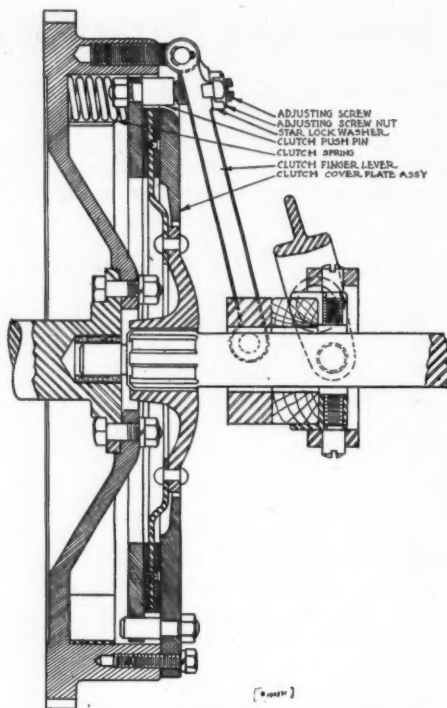
3—Adjustment on this clutch can be made by moving locknut and adjusting nut on clutch release rod to allow more clearance between the clutch release bearing and the plate. If properly adjusted there should be 1/32 in. clearance between the ball thrust bearing and the rear plate against which it operates. This and the clutch pedal should be adjusted by means of the set screw on the rear end of the clutch release.

Samson Clutch Adjustment

4—Give adjustment of clutch on model 15 and 25 Samson trucks.—Holkenbrink & Kaufman, Sigel, Ill.

4—The clutch on both the model 15 and model 25 are practically the same except the bearing collar assembly. A sectional view of one of these clutches is shown on this page. The clutch consists of a single driving plate lined on either side with a Thermoid facing and operates between a steel pressure ring and the outside cover plate.

When the clutch is engaged 12 coil springs force contact of the pressure rings and cover plate against the Thermoid facing of the driving plate, so that they revolve as a unit with the flywheel. When the clutch pedal is pressed downward the cover plate pressure ring continues to revolve while the driving plate which is connected with the main drive gear stops. The driving plate pressure ring and the cover plate require no lubrication and must be kept free from oil.



Sectional View of Samson Model 15 Clutch

The clutch throwout bearing on some of the models is made of especially treated wood and requires no lubrication.

Should the clutch slip the springs have probably become weakened and should be replaced. To replace the clutch springs disconnect the rear axle from the spring and move it backward a few inches, then remove the transmission and clutch housing which includes the flywheel.

Disconnect the three clutch throwout levers where they join the rim of the flywheel. The clutch cover plate cap screws in the rim of the flywheel can then be removed, giving access to the driving plate pressure rings and springs.

The only adjustment necessary to make on this clutch is to set the adjusting screws on the clutch throwout lever so that a .005 feeler will just pass between the end of the adjusting screw and clutch push pin. It is very important that the amount of clearance between the adjusting screws and push pins be the same on all three. After obtaining the proper adjustment bend over the edge of the star lock washer, bend up the adjusting screw nut lock washer in at least two places so that this nut will not work loose. Be sure that no pressure exists between the clutch bearing collar and the clutch throwout bearing after these adjustments have been made. These adjusting screws are shown in cut, at the point designated.

How Case Hardening Is Accomplished

Q—Supply information regarding case hardening where parts are to be finished by grinding. We sometimes find it advisable and necessary to make over and under size parts such as piston pins, universal joint bushing, push rods, bolts and shafts and would like to produce a rather deep case and do it in the least possible time. Give formula for hardening compound. —Heaberlin Brothers Garage, Kirksville, Mo.

There are two methods of case hardening, the fine grain case hardening which is used on tools and gears and other places which are very highly stressed and cyanide case hardening. An outfit for fine grain case hardening will consist of a good hardening oven, a number of hardening boxes, a good supply of raw bone, granulated, the same amount of granulated charcoal, some hydro-carbonated bone and the same amount of charred leather. A tank large enough to hold a good supply of water and a small tank to contain a bath of raw linseed oil. The following methods of procedure being customary no difficulty should be experienced in performing the case hardening operation successfully. Pack the articles to be hardened in a good animal carbon, when speaking of animal carbon, such things as raw bone and charred leather are included as being animal carbon. Make the box airtight by luting with clay, place in fire and keep at a red heat for a length of time sufficient to allow of hardening to the depth desired. A half hour of heat will allow of hardening of 1/32 in. deep, and hour 1/16 in. two hours 1/8 in. etc., the longer the heat-

ing period the greater the depth to which the pieces will be hardened. After the heating period has elapsed the parts may be taken from the box and quenched in cold water, or better still, they may be reheated to a cherry red and then quenched. When cool remove from the water and dry thoroughly to prevent rusting. To keep delicate articles from blistering during the heating process, dip them into a powder of burnt bone, leather or some other animal matter.

When small mild steel articles are required to be hardened very deep put the parts into a crucible and add enough cyanide of potash to cover them when melted. Cover the crucible and heat as required then remove parts and quench into a cold water bath. Another method is to heat the cyanide in an iron crucible or pot to a point where it is boiling. Then dip the article to be hardened into it. The article to be hardened should be a cherry red approximately at the time of dipping. Cherry color or a temperature of approximately 1300 degs. Fahr. is the average heating temperature for case hardening. A hardening mixture for general work is composed of salt two ounces, copperas 1 1/2 ounces, salamoniac 1 1/2 ounces, salt-peter 1 1/2 ounces, sal-soda 1 1/2 ounces and black oxide magnesia 8 ounces. The last two ingredients should be added after the others are mixed together. Before mixing the ingredients pulverize them separately, and then mix well and dry before using. Use like yellow prussiat of potash and plunge in water.

The ACCESSORY SHOW CASE

New Sources of Retail Profit

FERGUSON'S ADJUSTABLE VALVES FOR FORDS

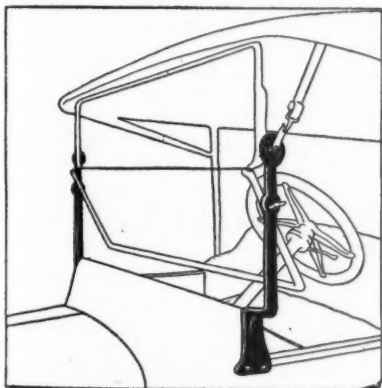
The installation of the Ferguson's adjustable valves for Fords is started by removing the cylinder head and taking out the old valves. In assembling, lift valve springs and insert pin in valve, then lift valve off its seat so that a wrench can be inserted between valve and top of motor, being careful not to mark valve seat with wrench. Take away valve lifter and the adjusters can easily be screwed on to valves, lift again and take away wrench. To adjust insert piece of ten thousandths shim stock between valve, push rod and adjuster, screw adjuster down leaving enough room so that you can move shim freely between push rod and adjuster. Then screw lock nut down to adjuster and tighten. Arthur T. Ferguson, 76 North St., Salem, Mass.

GUARDIAN MOTOR PROTECTOR

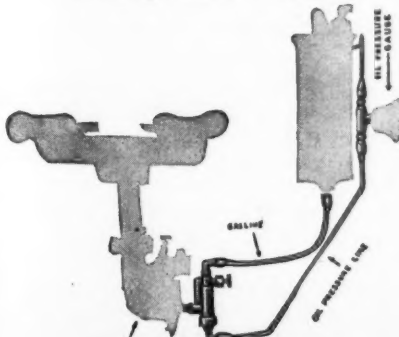
This device automatically stops the engine when the supply of lubricating oil is exhausted or the oil pump fails to function. It also automatically shuts off the fuel supply when engine is stopped. National Motor Supply Co., Muncie, Ind.

KLAXON FOR MODEL 61 CADILLAC

This horn is designed for use on the Cadillac 61 and is mounted on the cylinder block directly in back of the fan by means of two large cap screws. Price \$25, now standard equipment on the Cadillac 61.—Klaxon Co., Newark, N. J.



Buckstaff Breeze Brackets

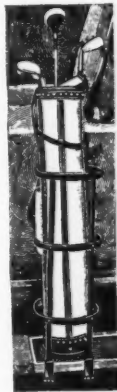


Guardian motor protector

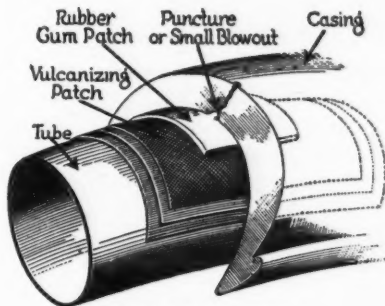


Left—Ferguson's adjustable valve for Fords

Right—Standley golf bag holder



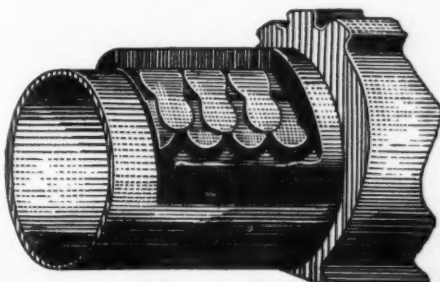
Klaxon for model 61 Cadillac



Va-Car tire plaster



Standley kiddie carrier



A. B. C. Puncture Proof Interliner

STANDLEY GOLF BAG HOLDER

The Standley golf bag holder is of flat steel construction finished in black baked enamel and is attached with malleable clamps and screws, \$4. Standley Mfg. Co., Boone, Iowa.

VA-CAR TIRE PLASTER

This plaster goes between the tube and casing. In the center is a soft rubber gum. The patch is to be placed directly under the hole in the tire. The gum stops up the hole and the rest of the patch vulcanizes itself to the casing. Virginia Carolina Rubber Co., Richmond, Va.

STANDLEY KIDDIE CARRIER

The Kiddie Carrier is of steel construction, machine riveted and folds up. It extends 10 to 50 ins. Complete with four black wen straps, finished in black baked enamel, \$8. Standley Mfg. Co., Boone, Iowa.

BUCKSTAFF BREEZE BRACKETS

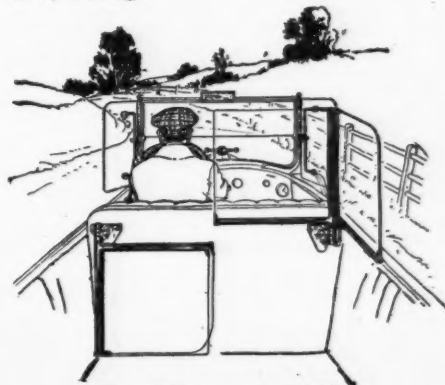
This bracket fastens to the body in the same manner as the regular Ford brackets, even to using the same bolt holes. It is finished in black enamel and does not change the appearance in the least. The purpose is to enable the driver to swing the bottom part of the windshield in or out, thereby affording ventilation. The windshield hinges in a slot in the bracket and is made adjustable with wing nuts. Buckstaff Breeze Bracket Co., 811 "O" street, Lincoln, Nebr.

H & H TONNEAU SHIELDS

H & H Tonneau Shields protect the occupants of the rear seat the same as the windshield protects the driver, and while not in use may be folded down back of the front seat. They are made in three styles, two-piece, three-piece and four-piece. Simplex Windshield Wing Co., 2206 Michigan Ave., Chicago.

A. B. C. PUNCTUREPROOF INTERLINER

This Interliner is made of rubber with strips of brass imbedded in it. It is made in one length and folds over on the ends. W. C. Frank & Son, 3213 N. Racine Ave., Chicago.



H and H tonneau shield

Progress in Aviation—1920 and 1921 Compared

Definite Progress in Bringing Air Travel to the Assistance of Business is Noted in the Number of Passengers Carried and Paid Mileage

COMMERCIAL aircraft in 1921 definitely began the demonstration of practical utility. The business man who, in 1919, was merely curious, and in 1920 was interested, became convinced, in 1921, that aerial transportation was no longer fancy, but fact. More miles were flown, more paid passengers booked and more package freight and goods carried.

| | 1920 | 1921 |
|--|-----------|---------------------|
| Estimated number of aircraft in operation..... | 1,000 | 1,200 |
| Estimated total mileage..... | 6,000,000 | 6,250,000-6,500,000 |
| Operating companies reporting..... | 88 | 125 |
| Equipment of these companies..... | 365-425 | 500-600 |
| Mileage flown by these companies..... | 3,136,550 | *2,907,245 |
| Number of passengers carried..... | 115,163 | 122,512 |
| Pounds of freight carried..... | 41,390 | 123,227 |
| Number of flights by operating companies..... | unknown | 130,736 |
| Average duration of flights..... | unknown | 21 minutes |
| Average charge for short flights..... | \$12.50 | \$9.00 |
| Average charge per mile for intercity flights..... | .65 | .55 |
| Average charge per pound for freight..... | unknown | .33 |
| States in which operations were carried on..... | 32 | 34 |
| Air terminal facilities..... | 128 | 146 |

* Decrease explained by less free and more paid flights.

The foregoing is believed by the Aeronautical Chamber of Commerce to be accurate. The census of craft, in the absence of Federal law requiring registration, is based upon the statements of 125 established operators, upon air service and naval estimates, and upon the personal observations of representatives of the chamber throughout the country. The 1,200 craft in operation represent an increase of 20 per cent over the figures for 1920, and, generally speaking, this percentage of increase is noted throughout.

Approximately one-half the equipment was controlled by established organizations, the other half being in the hands of the gypsy flier, the care-free and often too-careless itinerant, whose wanderings from coast to coast and from Mexico to Alaska have done a certain amount of good, but probably much more harm. It being known that the operators at fixed points covered approximately 3,000,000 miles, carrying about 122,500 passengers, it is estimated that, all told, rather more than 250,000 persons flew and that counting the wanderings of the gypsy, 5,500,000 miles were compassed by commercial aircraft during the year.

The most valuable service which aircraft provide is speed. Conjoined with this is their unique ability to operate independently of land or water, dominating both in time of war, and capable of adaptation in time of peace to a multitude of novel uses limited only by ingenuity and commercial and industrial needs.

The following visualizes the service of the airplane and airship:

NATIONAL—National Defense (Army, Navy, Marine Corps), Air Mail, Forest Patrol, Coast Guard, Customs and Revenue Service, Agricultural Survey, Coast and Geodetic Survey, Scientific Observation, Warning and Relief in Disaster.

CIVIC—City Planning, Road and Building Construction, Rail and Water terminal problems, Fire and Police Zoning, Park Improvement.

COMMERCIAL—Passenger Service, Freight Transportation, Messenger Service in Banking, Surveying, Engineering, Aerial Photography, Collection and Dissemination of News, Advertising and Publicity, Sport and Pleasure, Commuting.

"Commerce Demands Speed; Flying Is the Answer," is the timely and original trade phrase being urged by the operators. "Less Waste, More Speed," is the reply which commerce makes, through Samuel M. Felton, president of the Chicago Great Western railroad, and during the war director general of transportation for the A. E. F.

The airplane man, alive to what is undoubtedly the most vexing of all contemporary business problems, conceives the greatest commercial need to be swifter dispatch. The railroad

man, equally conscious of the need, but schooled with practical experience, demands economy. This is the challenge to commercial aircraft, and it is significant of the immediate future that, in 1921, improvement in construction, decrease in operating costs and increase in the factor of safety and reliability went far toward establishing the commercial aerial transportation business upon a sound financial basis, with but one thing lacking, and that about to be provided—the enactment by Congress of an aerial code.

Commerce is the same in principle, whether carried on in a thickly populated territory, well equipped with the most improved means of transportation, or whether in sparse regions poorly served, if at all, by conveyances on road, rail and water. Commerce is satisfactory only when conducted with dispatch, and there are circumstances and conditions under which commerce will gladly pay an increased tariff for increased speed.

The correctness of this statement is apparent upon the analysis of the following table showing aircraft operations by states:

| State | 1920 | 1921 | Increase | Decrease | State | 1920 | 1921 | Increase | Decrease |
|--------------------|------|------|----------|----------|-------------------|------|------|----------|----------|
| Alabama..... | 1 | 0 | --- | 1 | N. Hamps're | 1 | 1 | --- | --- |
| California..... | 8 | 10 | 2 | --- | N. Mexico..... | 1 | 0 | --- | 1 |
| Colorado..... | 3 | 1 | --- | 2 | New York..... | 9 | 15 | 6 | --- |
| Connecticut..... | 1 | 1 | --- | --- | N. Carolina..... | 2 | 0 | --- | 2 |
| Florida..... | 3 | 3 | --- | --- | N. Dakota..... | 0 | 1 | 1 | --- |
| Georgia..... | 2 | 0 | --- | 2 | Ohio..... | 7 | 6 | --- | 1 |
| Idaho..... | 0 | 1 | 1 | --- | Oklahoma..... | 2 | 5 | 3 | --- |
| Illinois..... | 2 | 8 | 6 | --- | Oregon..... | 3 | 1 | --- | 2 |
| Indiana..... | 7 | 1 | --- | 6 | Pennsylvania..... | 1 | 4 | 3 | --- |
| Iowa..... | 3 | 4 | 1 | --- | S. Carolina..... | 0 | 1 | 1 | --- |
| Kansas..... | 0 | 6 | 6 | --- | S. Dakota..... | 1 | 5 | 4 | --- |
| Kentucky..... | 0 | 1 | 1 | --- | Tennessee..... | 1 | 0 | --- | 1 |
| Louisiana..... | 1 | 1 | --- | --- | Texas..... | 2 | 12 | 10 | --- |
| Maine..... | 0 | 1 | 1 | --- | Utah..... | 1 | 0 | --- | 1 |
| Massachusetts..... | 1 | 3 | 2 | --- | Vermont..... | 2 | 1 | --- | 1 |
| Minnesota..... | 2 | 2 | --- | --- | Virginia..... | 1 | 2 | 1 | --- |
| Missouri..... | 1 | 6 | 5 | --- | Washington..... | 7 | 6 | --- | 1 |
| Montana..... | 0 | 2 | 2 | --- | W. Virginia..... | 0 | 1 | 1 | --- |
| Nebraska..... | 0 | 3 | 3 | --- | Wisconsin..... | 3 | 3 | --- | --- |
| Nevada..... | 0 | 1 | 1 | --- | Wyoming..... | 2 | 0 | --- | 2 |
| New Jersey..... | 4 | 5 | 1 | --- | | | | | |

States operated in 1920—32.

States operated in 1921—34.

States showing decrease in operations—12.

States showing increase in operations—22.

[NOTE.—Canada reported in 1920, but not in 1921.]

The greatest growth in commercial aerial transport has been in those parts of the country where the volume of traffic requiring rapid transit is such as to choke available surface facilities or where, surface facilities being antiquated, available traffic seeks other means of movement. In both cases commerce willingly pays a premium.

The table showing operations by states illustrates that the pressure upon the surface facilities in Illinois, Massachusetts, New Jersey, New York, Pennsylvania, etc., has encouraged the establishment of 18 new aircraft operators, all of which engage in occasional transport between cities, but which are handicapped in their endeavors to establish regular service by the absence of landing facilities, properly disseminated weather reports, and aerial law, which is primary to the legitimate general capitalization.

In California, Idaho, Iowa, Kansas, Kentucky, Maine, Missouri, Montana, Nebraska, Nevada, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Virginia and West Virginia where distances are great and surface facilities backward, commerce is willing to utilize aircraft. For the same service which appeals to the great business establishments of New York or Chicago, eager to hasten delivery and speed collection, appeals likewise to the small community, the progress of which manifestly rests upon the rapidity with which it releases itself from isolation and establishes quick contact with purchasing territory hitherto unattainable.

The tables and text presented are taken from the advance sheets of the 1922 Aircraft Year Book, shortly to be published by The Aeronautical Chamber of Commerce, 501 Fifth Avenue, New York City.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

| | | |
|--------------------|--|------------|
| Hartford, Conn.... | Connecticut Fair Grounds..... | Sept. 4-9 |
| Spokane, Wash.,... | Annual Show | Sept. 4-9 |
| Chicago | Annual Show of the Automotive Equipment Association | Nov. 13-18 |

RACES

| | | |
|---------------------|----------------------------------|---------|
| Tacoma, Wash.... | Eleventh Annual Race | July 4 |
| Strasbourg | French Grand Prix..... | July 15 |
| Colo. Spgs., Colo.. | Pike's Peak Race..... | Sept. 4 |
| San Carlos, Cal.... | 500-Mile Armistice Day Race..... | Nov. 11 |

FOREIGN SHOWS

| | | |
|---------------------|--|-----------------|
| Berlin | Kaiserdamm Hall | Sept. 25-Oct. 3 |
| Rio de Janeiro.... | Automotive Exhibition | Sept., 1922 |
| London | International Commercial Vehicle Ex- hibition | Oct. 12-13 |
| Paris, France | Automobile Show | Oct., 4-15 |
| London | Annual Show | Nov. 3-11 |

CONVENTIONS

| | | |
|---------------------------|------------------------------------|------------|
| Colo. Spgs., Colo.. | Automotive Equipment Assn..... | June 19-24 |
| White Sul'r Spgs., W.Va.. | S. A. E. Summer Meeting..... | June 20-24 |
| Olympia..... | Washington Automotive Trade Assn.. | July 21-22 |

New Moon Sedan on Six-Forty Chassis at \$1,695

THE newest offering of Moon is a five-passenger, four-door sedan, to sell at \$1,695.

For the most part, the steel panels are flanged by mechanical means which insure good workmanship and practically eliminates the use of solder. The moulding is rolled around the door and belt right into the panels themselves.

The roof is made up of light bows and slats and covered with wadding and water-proof top material. Each intersection of bow and slat is fastened to prevent any movement.

The windshield is of new design and construction. The lower section is stationary—upper half ventilating. Ventilation is secured through the cowl ventilator adjustable from the inside on the instrument board by a simple turn of a knob which raises and lowers the ventilator.

To further the conveniences of the car, an adjustable sun visor is included as regular equipment.

The radiator is German silver with a frontal area of 441 sq. inches.

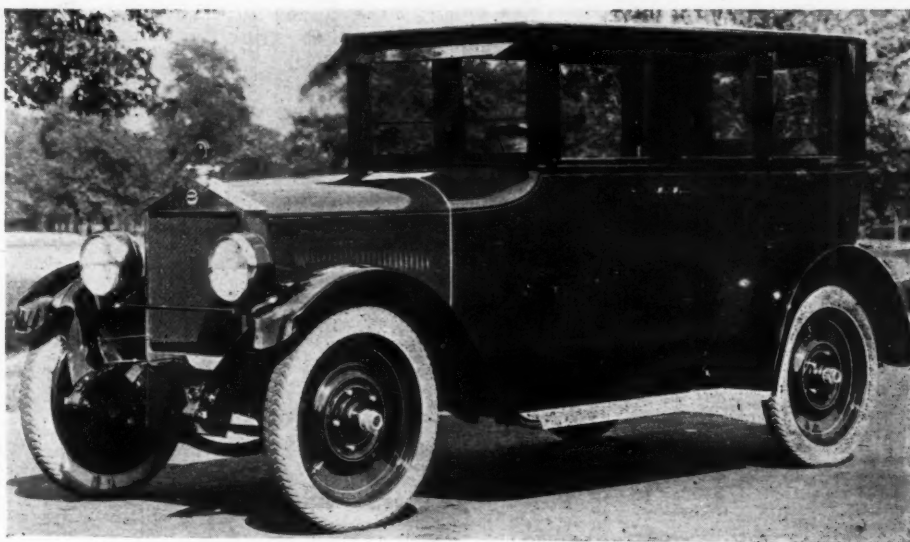
Lamps are drum type with law-complying lenses. Ball and socket mounted, permitting angling for any focus.

The sedan is trimmed in heavy broadcloth. Spring roll windowshades are of silk and the two rear doors have large portfolio extension pockets. There is a small compartment for tools located in the front snuff pad.

There is a dome light that operates automatically with the opening of the door, or from the switch control on the rear pillar.

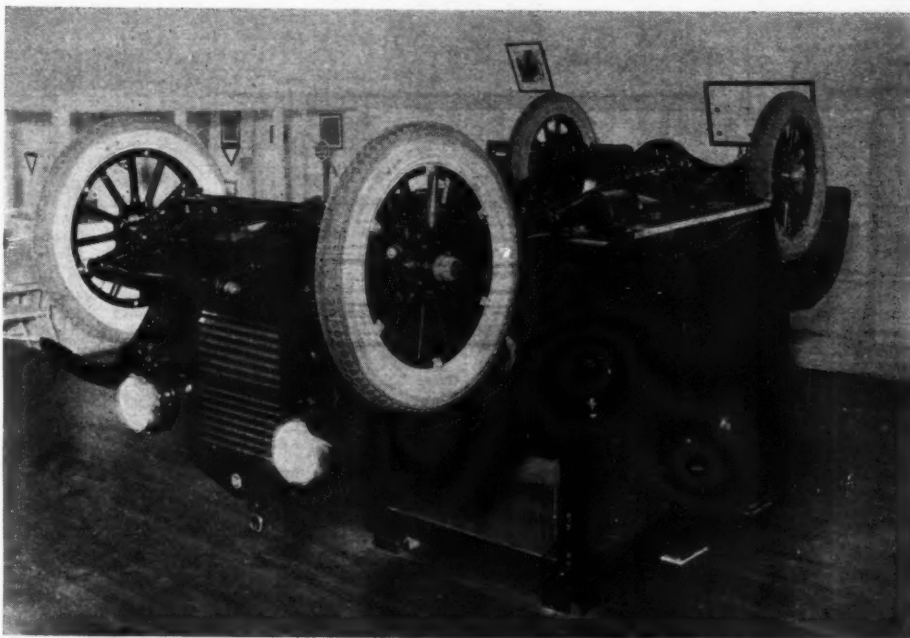
A BOOKLET THE DEALER CAN GIVE THE MOTORIST

"ONE Hundred and One Economies for the Motorist" is the title of an interesting booklet published by the Tide Water Oil Sales Corp., 11 Broadway, New York City. This booklet has many interesting points in the management of a vehicle. The booklets are intended to reach the owner and the publishers offer to supply them to automotive dealers in the numbers that the dealers will place them in the hands of the owner.



New Moon five passenger, four door sedan selling for \$1695

Demonstrating Structural Strength of Body



This unique display being shown by a number of Hudson-Essex dealers throughout the country, is causing interesting comment in automobile circles. The six blocks on which the inverted Essex coach rests support the entire weight of the body and chassis through the body's six uprights. Even with the car overturned the doors can be opened and closed without effort, Essex Motors announces.

Specifications of Current Motor Truck Models

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | | | |
|----------------------|---------------|---------------|-----------------|----------|-------------|----------------|---------------------------|---------------|-----------------|---------------|-------------|----------------|---------------|-----------------------|-----------------|---------|---------------|------------|----------|---|
| | | | | Front | Rear | | | | | Front | Rear | | | | | Front | Rear | | | |
| Acason.....RB | 1 1/2 | \$1050a | 3 1/2 x 5 | 34x5n | 34x5n | W | Corbitt.....A-22 | 3 1/2 | \$380 | 4 1/2 x 5 1/2 | 36x5 | 36x10 | W | Gramm-Pion. 75P | 3 1/2 | \$4225a | 4 1/2 x 5 1/2 | 36x6n | 42x9n | W |
| Acason.....H | 2 1/2 | 1950 | 3 1/2 x 5 1/2 | 36x5 1/2 | 36x5 1/2 | W | Corbitt.....AA-22 | 5 | 4500 | 4 1/2 x 5 1/2 | 36x6 | 40x6d | W | Gramm-Pion. 40 | 4 | 3995a | 4 1/2 x 5 1/2 | 36x5 | 36x5dk | W |
| Acason.....L | 3 1/2 | 2750 | 4 1/2 x 5 1/2 | 36x5 1/2 | 36x5 1/2 | W | Day-Elder.....AS | 1 | 1600 | 3 1/2 x 5 | 35x5n | 35x5n | W | Gramm-Pion. 50 | 5-6 | 4895a | 4 1/2 x 5 1/2 | 36x6 | 40x6dk | W |
| Acason.....M | 5 | 4350 | 5 x 6 1/2 | 36x6 | 40x12 | W | Day-Elder.....B | 1 1/2 | 2000 | 3 1/2 x 5 | 34x3 1/2 | 34x5 | W | Hahn.....B2 | 1 | .... | 3 1/2 x 5 | 34x5k | 34x5k | W |
| Ac.....C | 1 1/2 | 2205 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5k | W | Day-Elder.....D | 2 | 2400 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | Hahn.....O | 1 1/2 | .... | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x6k | W |
| Ac.....A | 2 1/2 | 2795 | 4 1/2 x 5 1/2 | 36x5 1/2 | 36x5n | W | Day-Elder.....C | 2 1/2 | 2750 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | Hahn.....K | 2 | .... | 4 1/2 x 5 1/2 | 36x7k | 36x8k | W |
| Acme.....20 | 1 | .... | 3 1/2 x 5 | 34x3 1/2 | 34x5 | W | Day-Elder.....E | 3 1/2 | 3150 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W | Hahn.....L | 3 | .... | 4 1/2 x 5 1/2 | 36x5k | 36x8k | W |
| Acme.....40 | 2 | .... | 3 1/2 x 5 | 34x3 1/2 | 34x5 | W | Day-Elder.....F | 5 | 4250 | 4 1/2 x 6 | 36x5k | 40x6dk | W | Hahn.....M | 5 | .... | 4 1/2 x 5 1/2 | 36x5 | 36x10 | W |
| Acme.....60 | 3 | .... | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | Dearborn.....E | 1 | 1600 | 3 1/2 x 5 1/2 | 35x5n | 35x5n | W | Hahn.....N | 6 | .... | 4 1/2 x 6 | 36x6 | 40x12 | W |
| Acme.....60L | 3 | .... | 4 1/2 x 5 1/2 | 36x4 | 36x7k | W | Dearborn.....FX | 1 1/2 | 2300 | 3 1/2 x 5 1/2 | 34x4 | 34x5 | W | Hal-Fur.....E | 1 1/2 | 2350 | 4 1/2 x 5 1/2 | 34x5n | 38x7n | W |
| Acme.....90 | 4 1/2 | .... | 4 1/2 x 5 1/2 | 36x5 | 40x10 | W | Dearborn.....F | 1 1/2 | 2180 | 3 1/2 x 5 1/2 | 34x4 | 34x5 | W | Hal-Fur.....B | 2 1/2 | 3000 | 4 1/2 x 5 1/2 | 36x6n | 36x8 | W |
| Acme.....125 | 6 1/2 | .... | 4 1/2 x 5 1/2 | 36x6 | 40x12 | W | Dearborn.....48 | 2 | 2590 | 3 1/2 x 5 1/2 | 34x4 1/2 | 34x7 | W | Hal-Fur.....F | 3 1/2 | 4000 | 4 1/2 x 5 1/2 | 36x6n | 40x10 | W |
| American.....25 | 2 1/2 | 3350 | 4 x 6 | 36x4k | 36x4dk | W | Defiance.....G | 1 | 1605a | 3 1/2 x 5 | 35x5n | 35x5n | B | Hall.....1 1/2 | 1 1/2 | 3100 | 3 1/2 x 5 | 34x5n | 38x7n | W |
| American.....40 | 4 | 4275 | 4 1/2 x 6 | 36x5k | 36x5dk | W | Defiance.....D | 1 1/2 | 2095a | 3 1/2 x 5 | 35x5n | 36x6n | I | Hall.....2 1/2 | 2 1/2 | 3275 | 4 1/2 x 5 1/2 | 36x4 | 36x6 | W |
| Armleder.....20 | 1 | 2350 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5k | W | Defiance.....E | 2 1/2 | 2275a | 3 1/2 x 5 | 35x5n | 38x7n | I | Hall.....3 1/2 | 3 1/2 | 4100 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W |
| Armleder.....21 | 1 1/2 | 2425 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x6 | W | Denby.....31 | 1 1/2 | 1485 | 3 1/2 x 5 | 35x5n | 35x5n | B | Hall.....5 | 5 | 5100 | 4 1/2 x 5 1/2 | 36x5 | 40x6d | W |
| Armleder.....40 | 1 1/2 | 2850 | 4 1/2 x 5 1/2 | 34x3 1/2 | 36x6 | W | Denby.....33 | 1 1/2 | 2145 | 3 1/2 x 5 | 35x5n | 38x7n | I | Hall.....7 ch in | 7 | 5100 | 4 1/2 x 5 1/2 | 36x5 | 40x6d | C |
| Armleder.....HW | 2 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4k | 36x7k | W | Denby.....34 | 2 | 2395 | 3 1/2 x 5 | 36x3 1/2 | 36x6 | I | Harvey.....WOA | 2 | 2650 | 4 1/2 x 5 1/2 | 34x4 | 34x7 | W |
| Armleder.....KW | 3 1/2 | 4150 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W | Denby.....35 | 2 1/2-3 | 2795 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | I | Harvey.....WFA | 2 1/2 | 2950 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W |
| Atlas.....MD | 1 | 1185 | 3 1/2 x 5 | 32x4 1/2 | 32x4 1/2 | W | Denby.....27 | 4 | 3895 | 3 1/2 x 5 1/2 | 36x5 | 36x5d | I | Harvey.....WHA | 3 1/2 | 3950 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W |
| Atterbury.....20R | 1 1/2 | 2475 | 3 1/2 x 5 | 34x3 1/2 | 34x5 | W | Denby.....210 | 5 | 4295 | 4 1/2 x 5 1/2 | 36x6 | 40x6d | W | Hawkeye.....K | 1 1/2 | 1850 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5k | I |
| Atterbury.....7CX | 3 1/2 | 3175 | 4 1/2 x 5 1/2 | 36x4 | 36x4d | W | Dependable.....A | 3 1/2-4 | 1650 | 3 1/2 x 5 1/2 | 34x5n | 36x6n | W | Hawkeye.....M | 2 | 2650 | 4 1/2 x 5 | 36x4k | 36x6k | I |
| Atterbury.....7D | 3 1/2 | 3975 | 4 1/2 x 5 1/2 | 36x5 | 40x5d | W | Dependable.....C | 2 1/2 | 2350 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5 | W | Hawkeye.....N | 3 1/2 | 3700 | 4 1/2 x 5 1/2 | 36x5k | 36x10k | I |
| Atterbury.....8E | 5 | 4975 | 4 1/2 x 6 | 36x5 | 40x6d | W | Dependable.....D | 2 1/2 | 2650 | 4 x 5 1/2 | 34x5 | 36x6 | W | Hendrickson.....O | 1 1/2 | 2200 | 3 1/2 x 5 1/2 | 36x4n | 36x5n | W |
| Autocar.....21UF | 1 1/2-2 | 1950 | 4 1/2 x 4 1/2 | 34x4k | 34x5k | D | Dependable.....E | 3 | 2950 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | Hendrickson.....N | 2 1/2 | 2690 | 4 1/2 x 5 1/2 | 36x4k | 36x7k | W |
| Autocar.....21UG | 1 1/2-2 | 2050 | 4 1/2 x 4 1/2 | 34x4k | 34x5k | D | Diamond T.....O-8 | 1-1 1/2 | 1975 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x5 | W | Hendrickson.....M | 3 1/2 | 3000 | 4 1/2 x 5 | 36x5k | 36x5dk | W |
| Autocar.....27H | 2 | 2950 | 4 x 5 1/2 | 34x5 | 36x7 | D | Diamond T.....T | 1 1/2 | 2250 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x5 | W | Hendrickson.....K | 5 | 4000 | 5 x 6 1/2 | 36x6 | 40x6 | W |
| Autocar.....27K2 | 2 | 3075 | 4 x 5 1/2 | 34x5 | 36x7k | D | Diamond T.....U | 2 1/2 | 2650 | 4 x 5 1/2 | 36x4 | 36x7 | W | Hurlburt.....A | 1 1/2 | 2850 | 4 x 5 1/2 | 34x4 | 34x5 | W |
| Autocar.....26Y | 5 | 3950 | 4 1/2 x 5 1/2 | 34x6 | 36x12 | D | Diamond T.....K | 3 1/2 | 3750 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W | Hurlburt.....B | 2 1/2 | 3750 | 4 1/2 x 5 1/2 | 36x4 | 36x4d | W |
| Available.....H1 1/2 | 1 1/2 | 2475 | 4 x 5 | 36x3 1/2 | 36x5k | W | Diamond T.....EL | 5 | 4325 | 4 1/2 x 5 1/2 | 36x6 | 40x6d | W | Hurlburt.....C | 3 1/2 | 4500 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W |
| Available.....H2 | 2 1/2 | 2775 | 4 x 5 | 36x4k | 36x6k | W | Diamond T.....S | 5 | 4500 | 4 1/2 x 6 | 36x6 | 40x6d | W | Hurlburt.....D | 5 | 5500 | 4 1/2 x 6 | 36x5 | 40x6d | W |
| Available.....H2 1/2 | 2 1/2 | 3160 | 4 x 5 | 36x4k | 36x8k | W | Diehl.....A | 1 | .... | 3 1/2 x 5 | 34x4 1/2 | 35x5 | I | Indep'd't (Iowa), B | 1 | 1605 | 3 1/2 x 5 | 34x3 1/2 | 34x4 | I |
| Available.....H3 1/2 | 3 1/2 | 4175 | 4 1/2 x 5 1/2 | 36x5 | 40x5d | W | Diehl.....B | 1 1/2 | .... | 3 1/2 x 5 | 36x6 | 36x6 | I | Indep'd't (Iowa), G | 1 1/2 | 2040 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5 | I |
| Available.....H5 | 5 | 5375 | 5 x 6 | 36x6 | 40x12 | W | Doane.....2 1/2 | 2 1/2 | 4100b | 4 1/2 x 5 1/2 | 36x5 | 36x5d | C | Indep'd't (Ia.), HI | 1 1/2 | 2940 | 4 1/2 x 5 1/2 | 36x4 | 36x4 | I |
| *Avery.....1 | 1 | .... | 3 x 4 1/2 | 34x5n | 34x5n | I | Doane.....3 | 3 | 5100b | 4 1/2 x 5 1/2 | 36x5 | 40x6d | C | Indep'd't (Ohio), F | 1 1/2 | 2385 | 3 1/2 x 5 | 36x3 1/2 | 36x5 | W |
| | | | | | | | Doane.....6 | 6 | 6000b | 5 x 6 1/2 | 36x6 | 40x6d | C | Indep'd't (Ohio), H | 1 1/2 | 3085 | 4 1/2 x 5 1/2 | 36x4 | 36x4d | W |
| | | | | | | | *Dodge Brothers.....1 1/2 | 1 1/2 | 730 | 3 1/2 x 4 1/2 | 32x4n | 32x4n | B | Indep'd't (Ohio), K | 3 1/2 | 3985 | 4 1/2 x 5 1/2 | 36x5 | 36x5d | W |
| | | | | | | | Dorris.....K-4 | 2-2 1/2 | 3400 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | Indep'd't (Ohio), L | 12 | .... | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x5k | W |
| | | | | | | | Dorris.....K-7 | 3 1/2 | 4400 | 4 1/2 x 5 1/2 | 36x5 | 36x10 | W | Indiana.....20 | 20 | .... | 4 1/2 x 5 1/2 | 36x4k | 36x7k | W |
| | | | | | | | *Dort.....103 | 6 | 685a | 3 1/2 x 5 | 31x4n | 31x4n | B | Indiana.....25 | 25 | .... | 4 1/2 x 5 1/2 | 36x4 | 36x8k | W |
| | | | | | | | Double Drive.....A | 3 | 4000 | 4 1/2 x 5 1/2 | 6 | 6 | W | Indiana.....35 1/2 | 35 1/2 | .... | 4 1/2 x 5 1/2 | 36x5k | 36x5dk | W |
| | | | | | | | Duplex.....A | 2 | 2775 | 4 x 5 1/2 | 35x5n | 38x7n | W | Indiana.....51 | 51 | .... | 5 x 6 1/2 | 36x5k | 40x6dk | W |
| | | | | | | | Duplex.....E | 3 1/2 | 3500 | 4 1/2 x 5 1/2 | 36x8 | 36x8 | I | *International.....S | 3 1/2 | 1500 | 3 1/2 x 5 | 34x5n | 34x5n | I |
| | | | | | | | Duty.....22 | 2 | 1590 | 3 1/2 x 5 | 34x3 1/2 | 34x5 | I | International.....21 | 1 1/2 | 1750 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x3 1/2 | I |
| | | | | | | | | | | | | | I | International.....31 | 1 1/2 | 1850 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x4 | I |
| | | | | | | | Eagle.....101 | 1 1/2 | 1875 | 3 1/2 x 5 1/2 | 34x5 | 34x5 | I | International.....41 | 2 | 2100 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x5 | I |
| | | | | | | | Eagle.....100-2 | 2 | 2275 | 3 1/2 x 5 1/2 | 34x4k | 34x7k | I | International.....461 | 3 | 2400 | 4 1/2 x 5 | 36x4 | 36x6 | I |
| | | | | | | | F. W. D.....B | 3 | 4200 | 4 1/2 x 5 1/2 | 36x6 | 36x6 | B | International.....101 | 5 | 3600 | 4 1/2 x 5 | 36x5 | 40x10 | I |
| | | | | | | | Fagel.....1 1/2 | 1 1/2 | 3000 | 3 1/2 x 5 1/2 | 34x3 1/2 | 34x6k | W | Jackson.....4WD | 3 1/2 | 3850 | 4 1/2 x 5 1/2 | 36x7 | 36x7 | B |
| | | | | | | | Fagel.....2 1/2 | 2 1/2 | 3900 | 4 1/2 x 5 1/2 | 34x4 | 36x7 | W | Jumbo.....15 1/2 | 15 1/2 | 2295 | 3 1/2 x 5 1/2 | 36x3 1/2</ | | |

Specifications of Current Motor Truck Models—Continued

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | Final Drive | |
|--------------------|---------------|---------------|-----------------|-------------------|-------------|------------------------|---------------|---------------|-----------------|-------------------|-------------|-----------------------|-----------------|---------------|-----------------|-------------------|-------------------|---|
| | | | | Front Rear | | | | | | Front Rear | | | | | | Front Rear | | |
| Koehler.....F | 3 1/2 | \$4470 | 4 1/2 x 5 1/2 | 36x5 36x10 | W | Old Reliable....B | 2 1/2 | \$3500 | 4 1/2 x 6 | 34x4 36x4d | W | Signal.....R | 5 | \$4400 | 4 1/2 x 6 | 36x6 40x6d | W | |
| Koehler, MT. Trc. | 3 1/2 | 3275 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | Old Reliable....C | 3 1/2 | 4250 | 4 1/2 x 6 | 36x5 36x5d | W | Southern.....10 | 1 | 2090 | 3 1/2 x 5 1/2 | 34x3 1/2 34x4 | W | |
| Krebs-Collier. 23 | 3 1/2 | 1260 | 3 1/2 x 5 | 34x4 1/2 34x4 1/2 | B | Old Reliable....D | 5 | 5250 | 4 1/2 x 6 | 36x6 40x6d | W | Southern.....15 | 1 1/2 | 2590 | 3 1/2 x 5 1/2 | 36x6n 34x4 | W | |
| Krebs-Collier. 24 | 3 1/2 | 1565 | 3 1/2 x 5 | 34x5 34x5 | W | Old Reliable KLM | 7 | 6000 | 4 1/2 x 6 | 36x6 40x7d | C | Southern.....20 | 2 | 2090 | 3 1/2 x 5 1/2 | 36x6n 40x8k | W | |
| Krebs-Collier. 45 | 1 1/2 | 2125 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | *Oldsmobile Econ | 1 | 1005 | 3 1/2 x 5 1/2 | 35x5n 35x5n | I | Standard.....1-K | 1 1/2 | 1600 | 3 1/2 x 5 | 34x3 1/2 34x5k | W | |
| Krebs-Collier. 75 | 2 1/2 | 2375 | 4 1/2 x 5 1/2 | 36x4 36x8 | W | Olympic.....A | 2 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x8 | W | Standard.....76 | 2 1/2 | 2400 | 4 1/2 x 5 1/2 | 36x4k 36x7k | W | |
| Krebs-Collier. 110 | 3 1/2 | 2975 | 4 1/2 x 5 1/2 | 36x5 40x10 | W | Oshkosh.....A | 2 | 3250 | 3 1/2 x 5 | 36x6n 36x6n | B | Standard.....66 | 3 1/2 | 3150 | 4 1/2 x 5 1/2 | 36x5 36x10 | W | |
| Larrabee.....X-2 | 1 1/2 | 1925 | 3 1/2 x 4 1/2 | 34x5n 34x5n | B | Oshkosh.....AA | 2 | 3400 | 4 1/2 x 5 1/2 | 36x6n 36x6n | B | Standard.....5-K | 5-7 | 4400 | 4 1/2 x 5 1/2 | 36x6 40x12 | W | |
| Larrabee.....U | 1 1/2 | 2400 | 3 1/2 x 5 | 34x5 34x5 | W | Oshkosh.....B | 2 1/2 | 3850 | 4 1/2 x 5 1/2 | 38x7n 38x7n | B | Sterling.....1 1/2 | 1 1/2 | 2885 | 4 1/2 x 5 1/2 | 36x3 1/2 36x5k | W | |
| Larrabee.....J | 1 1/2 | 2100 | 3 1/2 x 5 | 34x3 1/2 34x5k | W | Oshkosh.....BB | 2 1/2 | 4000 | 4 1/2 x 5 1/2 | 38x7n 38x7n | B | Sterling.....2 | 2 | 3085 | 4 1/2 x 5 1/2 | 36x4k 36x4k | W | |
| Larrabee.....K | 2 1/2 | 3100 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | *Overland.....4 | 1 1/2 | 450 | 3 1/2 x 4 | 30x3 1/2 30x3 1/2 | B | Sterling.....2 1/2 | 2 1/2 | 3290 | 4 1/2 x 5 1/2 | 36x4k 36x4k | W | |
| Larrabee.....L-4 | 3 1/2 | 4000 | 4 1/2 x 5 1/2 | 36x5 36x5d | W | Packard.....EC | 1 1/2-3 | 3100 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | Sterling.....3 1/2 | 3 1/2 | 4325 | 4 1/2 x 5 1/2 | 36x5k 40x5d | W | |
| Larrabee.....W | 5 | 4800 | 4 1/2 x 6 | 36x6 40x6d | W | Packard.....ED | 2-4 1/2 | 4100 | 4 1/2 x 5 1/2 | 36x5 36x5d | W | Sterling.....5-W | 5 | 4950 | 5 x 6 1/2 | 36x6 40x6d | C | |
| Maccar.....L | 1 1/2 | 2700 | 4 1/2 x 5 1/2 | 36x4 36x6 | W | Packard.....EF | 4-7 1/2 | 4500 | 5 x 5 1/2 | 36x6 40x6d | W | Sterling.....5-C | 5 | 5500 | 5 x 6 1/2 | 36x6 40x6d | C | |
| Maccar.....H-A | 2 | 3400 | 4 1/2 x 5 1/2 | 36x4 36x6d | W | Paige.....52-19 | 1 1/2 | 1950 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Sterling.....7 1/2 | 7 1/2 | 6000 | 5 x 6 1/2 | 36x6 40x7d | C | |
| Maccar.....H-2 | 3 | 3400 | 4 1/2 x 5 1/2 | 36x4 36x6d | W | Paige.....51-19 | 3 1/2 | 3145 | 4 1/2 x 5 1/2 | 36x5 36x5d | W | *Stewart.....14 | 1 1/2-1 1/2 | 1245 | 3 1/2 x 5 1/2 | 34x4 1/2 34x4 1/2 | I | |
| Maccar.....H-3 | 4 | 4200 | 4 1/2 x 5 1/2 | 36x4 36x6d | W | Parker.....C-22 | 1 | 1875 | 3 1/2 x 5 1/2 | 34x5n 34x5n | W | Stewart.....15 | 1 1/2 | 1445 | 3 1/2 x 5 1/2 | 35x5n 36x5n | I | |
| Maccar.....G | 5-6 | 4950 | 4 1/2 x 6 | 36x5 40x6d | W | Parker.....G-22 | 2 1/2 | 3200 | 4 1/2 x 5 1/2 | 34x4 36x4d | W | Stewart.....9 | 9 | 1790 | 3 1/2 x 5 | 34x3 1/2 34x5 | I | |
| MacDonald.....A | 1 1/2 | 7550 | 4 1/2 x 5 | 40x7 40x14 | I | Parker.....J-20 | 3 1/2 | 3950 | 4 1/2 x 6 | 36x5 40x5d | W | Stewart.....7-2-2 1/2 | 7-2-2 1/2 | 2190 | 4 1/2 x 5 1/2 | 34x4 34x7 | I | |
| Mack.....AB D.R. | 1 1/2 | 3150 | 4 1/2 x 5 | 36x4 36x3 1/2 d | D | Parker.....M-20 | 5 | 4850 | 5 x 6 | 36x6 40x6d | W | Stewart.....7-X | 2 1/2-3 | 2390 | 4 1/2 x 5 1/2 | 34x4 34x7 | I | |
| Mack.....AB Chain | 2 | 3300 | 4 1/2 x 5 | 36x4 36x4d | C | Patriot.....Reverse | 1 | 1380 | 3 1/2 x 5 | 35x5n 35x5n | W | Stewart.....10 | 3 1/2-4 | 3190 | 4 1/2 x 5 1/2 | 36x5 36x5d | I | |
| Mack.....AB Chain | 2 | 3300 | 4 1/2 x 5 | 36x4 36x4d | C | Patriot.....Lincoln | 2 | 2050 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Stewart.....10-X | 3 1/2-4 | 3190 | 4 1/2 x 5 1/2 | 36x5 36x5d | I | |
| Mack.....AB Chain | 2 | 3300 | 4 1/2 x 5 | 36x4 36x4d | C | Patriot.....Wash'n | 3 | 2900 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | *Stoughton.....C | 3 1/2 | 1240 | 3 1/2 x 5 | 34x4 1/2 34x4 1/2 | W | |
| Mack.....AB D.R. | 2 1/2 | 3750 | 4 1/2 x 5 | 36x4 36x4d | D | Pierce-Arrow.....2 | 3200 | 2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x4d | W | Stoughton.....A | 1 | 1700 | 3 1/2 x 5 | 34x5 34x5 | W |
| Mack.....AB D.R. | 2 1/2 | 3850 | 4 1/2 x 5 | 36x4 36x4d | D | Pierce-Arrow.....3 1/2 | 4350 | 5 | 4850 | 4 1/2 x 5 1/2 | 36x5 36x5d | W | Stoughton.....B | 1 1/2 | 2150 | 3 1/2 x 5 1/2 | 36x3 1/2 36x5 | W |
| Mack.....AB Chain | 2 1/2 | 3400 | 4 1/2 x 5 | 36x4 36x4d | D | Pittsburgh.....1 1/2-2 | 3000 | 3 | 3800 | 4 1/2 x 5 1/2 | 36x5 40x6d | W | Stoughton.....D | 2 | 2490 | 4 1/2 x 5 1/2 | 36x4 36x7 | W |
| Mack.....AC Chain | 5 | 4950 | 5 x 6 | 36x6 40x6d | C | Pittsburgh.....3 | 3800 | 3 | 3150 | 3 1/2 x 5 1/2 | 36x5 36x7 | W | Stoughton.....F | 3 | 3150 | 4 1/2 x 5 1/2 | 36x5 1/2 36x5 1/2 | W |
| Mack.....AC Chain | 5 | 4950 | 5 x 6 | 36x6 40x6d | C | Power.....F | 2 | 3150 | 3 1/2 x 5 1/2 | 36x5 36x7 | W | Sullivan.....E | 2 | 2800 | 4 1/2 x 5 1/2 | 36x4k 36x7k | W | |
| Mack.....AC Chain | 5 | 4950 | 5 x 6 | 36x6 40x6d | C | Power.....C | 3 1/2 | 4250 | 4 1/2 x 5 1/2 | 36x5 40x10 | W | Sullivan.....H | 3 1/2 | 3750 | 4 1/2 x 6 | 36x5 36x5d | W | |
| Mack Trac.....AB | 7 | 4950 | 5 x 6 | 36x6 40x6d | C | *Rainier.....R-21 | 3 1/2 | ..... | 3 1/2 x 5 | 35x5n 35x5n | W | *Thomart.....1 1/2 | 1705n | 4 1/2 x 5 1/2 | 34x5 34x5 | C | | |
| Mack Trac.....AC | 10 | 5500 | 5 x 6 | 36x6 40x6d | C | Rainier.....R-21 | 3 1/2 | ..... | 3 1/2 x 5 | 34x3 1/2 34x4 | W | Tiffin.....GW | 1 1/2 | 2100 | 4 1/2 x 5 1/2 | 36x3 1/2 36x5 | W | |
| Mack Trac.....AC | 13 | 5750 | 5 x 6 | 36x6 40x6d | C | Rainier.....R-26 | 1 1/2 | ..... | 3 1/2 x 5 | 34x3 1/2 34x5 | W | Tiffin.....MW | 1 1/2 | 2700 | 4 1/2 x 5 1/2 | 36x4 36x3 1/2 | W | |
| Mack Trac.....AC | 15 | 6000 | 5 x 6 | 36x6 40x6d | C | Rainier.....R-28 | 2 | ..... | 3 1/2 x 5 | 34x4 34x6 | W | Tiffin.....PW | 3 1/2 | 3600 | 4 1/2 x 5 1/2 | 36x5 40x5d | W | |
| Mapleleaf.....AA* | 3 | 3775 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tiffin.....F50 | 5 | 4300 | 4 1/2 x 6 | 36x6 40x6d | W | |
| Mapleleaf.....BB** | 4 | 4350 | 4 1/2 x 5 1/2 | 36x4 36x7d | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tiffin.....F60 | 6 | 4500 | 4 1/2 x 6 | 36x6 40x6d | W | |
| Mapleleaf.....CC** | 5 | 5100 | 4 1/2 x 5 1/2 | 36x4 36x7d | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Titan.....2 1/2 | 2750 | 4 1/2 x 5 1/2 | 36x4k 36x7k | D | | |
| Mapleleaf.....DD** | 5 | 5100 | 4 1/2 x 5 1/2 | 36x4 36x7d | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Titan.....3 1/2 | 3950 | 4 1/2 x 5 1/2 | 36x5k 40x10k | D | | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Titan.....5 | 4550 | 4 1/2 x 5 1/2 | 36x5 40x12 | D | | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....J | 1 1/2 | 2900 | 4 1/2 x 5 1/2 | 35x5 38x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....G | 3 1/2 | 4100 | 4 1/2 x 5 1/2 | 36x5 36x5d | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | W | |
| Master.....JD | 1 1/2 | 2230 | 4 1/2 x 5 1/2 | 34x3 1/2 34x5 | W | Rainier.....R-28 | 2 1/2 | ..... | 3 1/2 x 5 1/2 | 34x4 34x6 | W | Tower.....H | 3 1/2 | 3200 | 4 1/2 x 5 1/2 | 36x4 36x7 | | |

Specifications of Current Motor Truck Models—Continued

| NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | | Final Drive | NAME AND MODEL | Tons Capacity | Chassis Price | Bore and Stroke | TIRES | | Final Drive | | | | | |
|--------------------|---------------|---------------|-----------------|----------|-------|-------------|---|---------------|---------------|-----------------|----------|-------------|-------------|------------------|---------------|---------------|-----------------|----------|-----------------|-------------|------|-----------|----------|-------|---|
| | | | | Front | Rear | | | | | | Front | Rear | | | | | | Front | Rear | | | | | | |
| Walter.....S | 5 | \$4850 | 4 1/2 x 6 1/2 | 36x6 | 40x6d | W | Wichita.....K | 1 | \$1875 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x4k | W | Wilcox.....F | 5 | \$4350 | 4 1/2 x 6 1/2 | 36x5 | 40x6d | W | | | | | |
| Ward-LaF.....2B | 2 1/2 | 2990 | 4 1/2 x 5 1/2 | 36x4 | 36x4d | W | Wichita.....M | 2 | 2400 | 2 1/2 x 5 1/2 | 36x3 1/2 | 36x6k | W | Wilson.....F | 1 1/2 | 2270 | 3 1/2 x 5 1/2 | 36x3 1/2 | 36x5 | W | | | | | |
| Ward-LaF.....4A | 3 1/2 | 3990 | 4 1/2 x 6 1/2 | 36x5 | 36x5d | W | Wichita.....RX | 3 | 3200 | 4 1/2 x 5 1/2 | 36x4k | 36x8k | W | Wilson.....EA | 2 1/2 | 2825 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | | | | | |
| Ward-LaF.....5A | 5 | 4590 | 5 x 6 1/2 | 36x6 | 40x6d | W | Wichita.....O | 4 | 3500 | 4 1/2 x 6 1/2 | 36x5k | 36x5k | W | Wilson.....G | 3 1/2 | 3685 | 4 1/2 x 5 1/2 | 36x5 | 36x5 | W | | | | | |
| *Watson.....B | 1 | 1865a | 3 1/2 x 5 1/2 | 35x5n | 35x5n | W | Wilcox.....AA | 1 | 1900 | 3 1/2 x 5 1/2 | 36x4k | 36x4k | W | Wilson.....H | 5 | 4520 | 4 1/2 x 6 | 36x6 | 40x6 | W | | | | | |
| Watson.....N | 3 1/2 | 4250 | 4 1/2 x 5 1/2 | 36x5 | 36x10 | W | Wilcox.....BB | 1 1/2 | 2550 | 4 1/2 x 5 | 36x4 | 36x5 | W | *Wisconsin.....A | 1 | 1750 | 3 1/2 x 5 | 34x5n | 34x5n | W | | | | | |
| Western.....W1 1/2 | 1 1/2 | 2550 | 4 1/2 x 5 1/2 | 36x3 1/2 | 36x5k | W | Wilcox.....D | 2 1/2 | 3000 | 4 1/2 x 5 | 36x4k | 36x3 1/2 dk | W | Wisconsin.....B | 1 1/2 | 2100 | 3 1/2 x 5 | 35x5 | 36x6 | W | | | | | |
| Western.....L1 1/2 | 1 1/2 | 2550 | 3 1/2 x 5 | 36x3 1/2 | 36x5k | W | Wilcox.....E | 3 1/2 | 3950 | 4 1/2 x 6 | 36x5k | 36x5dk | W | Wisconsin.....C | 2 1/2 | 2700 | 4 x 5 1/2 | 36x6n | 36x7 | W | | | | | |
| Western.....W2 1/2 | 2 1/2 | 3250 | 4 1/2 x 5 1/2 | 36x4 | 36x7 | W | | | | | | | | Wisconsin.....D | 3 1/2 | 3000 | 4 1/2 x 6 1/2 | 36x6n | 40x8 | W | | | | | |
| Western.....L2 1/2 | 2 1/2 | 3250 | 4 1/2 x 6 | 36x4 | 36x7 | W | | | | | | | | Wisconsin.....E | 5 | 3500 | 4 1/2 x 6 1/2 | 36x6 | 36x10 | W | | | | | |
| Western.....W3 1/2 | 3 1/2 | 4250 | 4 1/2 x 6 | 36x5 | 40x5d | W | | | | | | | | Wisconsin.....F | 7 | 4000 | 5 x 6 1/2 | 36x6 | 36x12 | W | | | | | |
| *White.....15 | 15 | 2400 | 3 1/2 x 5 1/2 | 34x5n | 34x5n | B | FINAL DRIVE:—B—Bevel, C—Chain, D—Double Reduction, I—Internal Gear, W—Worm. r—8 cyl. s—6 cyl. t—2 cyl.—all others are 4 cyl. d—dual tires. k—pneumatic tires. a—price includes several items of equipment, b—price includes body. *—Canadian Make. speed truck or delivery wagon. **—Canadian Make. trac—tractor. | | | | | | | | | | | | Witt-Will.....N | 1 1/2 | 2250 | 3 1/2 x 5 | 36x3 1/2 | 36x5k | W |
| White.....20 | 20 | 2450 | 4 1/2 x 5 1/2 | 36x4k | 36x7 | D | | | | | | | | Witt-Will.....P | 2 1/2 | 2750 | 4 1/2 x 5 1/2 | 36x3 1/2 | 36x7k | W | | | | | |
| White.....40 | 40 | 4200 | 4 1/2 x 5 1/2 | 36x5 | 40x6d | D | | | | | | | | Wolverine.....J | 1 | 2125 | 3 1/2 x 5 | 34x3 | 34x4 | I | | | | | |
| White.....45 | 45 | 4500 | 4 1/2 x 5 1/2 | 36x6 | 40x6d | D | | | | | | | | Wolverine.....J | 1 1/2 | 2375 | 4 1/2 x 5 1/2 | 36x3 1/2 | 34x5 | I | | | | | |
| White Hick.....E | 1 | 1225 | 3 1/2 x 5 | 34x5n | 34x5n | W | | | | | | | | Wolverine.....J | 2 | 2640 | 3 1/2 x 5 | 34x4 | 34x7 | I | | | | | |
| White Hick.....H | 1 1/2 | 1375 | 3 1/2 x 5 | 36x3 1/2 | 36x5 | W | | | | | | | | Wolverine.....J | 2 1/2 | 3425 | 4 1/2 x 5 1/2 | 36x5 | 36x10 | I | | | | | |
| White Hick.....K | 2 1/2 | 1675 | 4 1/2 x 5 1/2 | 36x4 | 36x5 | W | | | | | | | | Wolverine.....L | 3 1/2 | 4100 | 4 1/2 x 5 1/2 | 36x5 | 36x10 | I | | | | | |

Specifications of Current Farm Tractor Models

| TRADE NAME | Rating | Price | Wheels or Crawlers | Engine | Cylinders: Bore, Stroke | Fuel | Plow Capacity | TRADE NAME | Rating | Price | Wheels or Crawlers | Engine | Cylinders: Bore, Stroke | Fuel | Plow Capacity | TRADE NAME | Rating | Price | Wheels or Crawlers | Engine | Cylinders: Bore, Stroke | Fuel | Plow Capacity |
|------------------|---------|-------|--------------------|--------|-------------------------|--------|---------------|-----------------|---------|-------|--------------------|--------|-------------------------|--------|---------------|-------------------|---------|--------|--------------------|--------|-------------------------|--------|---------------|
| Allis-Chal.G.P | 6-12 | \$250 | 2 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 1 | Fordson..... | 18 | \$395 | 4 | Own | 4-4 x 5 | G,K | 2 | Peoria.....L | 12-25 | \$1600 | 4 | Clim. | 4-5 x 6 1/2 | G,K | 3 |
| Allis-Chalm..B | 6-12 | 325 | 2 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 1 | Fox.....E | 20-40 | 2390 | 4 | Own | 4-5 1/2 x 7 1/2 | G or K | 4 | Pioneer.....C | 18-36 | 1750 | 4 | Own | 4-5 1/2 x 6 | G,K,D | 4 |
| Allis-Chalm.. | 15-25 | 1185 | 4 | Midw. | 4-4 1/2 x 5 1/2 | Gas. | 3 | Franklin.....G | 18-30 | 4000 | *2 | Clim. | 4-5 x 6 1/2 | G or K | 3-4 | Pioneer.....G | 40-75 | 3550 | 4 | Own | 4-7 x 8 | Gas. | 10 |
| Allis-Chalm.. | 20-35 | 1885 | 4 | Own | 4-4 1/2 x 6 1/2 | G or K | 3-4 | Franklin.....C | 18-30 | 3350 | *2 | Clim. | 4-5 x 6 1/2 | G or K | 3-4 | Plowman.....A | 15-30 | 1295 | 4 | Buda | 4-4 1/2 x 6 | G,K | 3-4 |
| Allis-Chalm.. | 20-35 | 2085 | 4 | Own | 4-4 1/2 x 6 1/2 | G | 4 | Franklin.....G2 | 18-30 | 4350 | 4 | Clim. | 4-5 x 6 1/2 | G or K | 3-4 | | | | | | | | |
| Allwork.....2-G | 14-28 | 1695 | 4 | Own | 4-4 1/2 x 6 | G or K | 3 | Fricks.....A | 12-20 | .... | 4 | Erd. | 4-4 x 6 | G,K | 2-3 | Reliable..... | 10-20 | 390 | 4 | Own | 2-6 x 7 | Ker. | 2 |
| Allwork.....C | 14-28 | 1395 | 4 | Own | 4-5 x 6 | G or K | 4 | Fricks.....C | 15-25 | .... | 4 | Beav. | 4-4 1/2 x 6 | G,K | 3-4 | Rel. | 12-25 | 1600 | 4 | Wauk | 4-4 1/2 x 5 1/2 | G or K | 3 |
| AndrewsKin.D | 18-36 | 2500 | 4 | Clim. | 4-5 x 6 1/2 | G or K | 4 | | | | | | | | | Russell..... | 12-24 | 1500 | 4 | Own | 4-4 1/2 x 5 1/2 | G or K | 2-3 |
| ARO.....1921-22 | 3-6 | 385 | 4 | Own | 1-4 1/2 x 5 | Gas. | 1 | Grain Belt..A | 18-36 | 2150 | 4 | Wauk | 4-4 1/2 x 6 1/2 | G or K | 4 | Russell..... | 15-30 | 2200 | 4 | Own | 4-5 x 6 1/2 | G or K | 3-4 |
| Aultman-T..... | 15-30 | 2200 | 4 | Clim. | 4-5 x 6 1/2 | G,K | 4 | Gray.....1920 | 18-36 | .... | 3 | Wauk | 4-4 1/2 x 6 1/2 | Gas. | 4 | Russell..... | 20-35 | 3000 | 4 | Own | 4-5 1/2 x 7 | G or K | 4-5 |
| Aultman-T..... | 22-45 | 3420 | 4 | Own | 4-5 1/2 x 6 | G,K | 4 | Gt. Western St | 20-30 | 1950 | 4 | Beav. | 4-4 1/2 x 6 | K | 4 | Russell..... | 30-60 | 5000 | 4 | Own | 4-8 x 10 | G or K | 8-10 |
| Aultman-T..... | 30-60 | 4500 | 4 | Own | 4-7 x 8 | G,K,D | 4-10 | | | | | | | | | | | | | | | | |
| Automot. B-3. | 12-21 | 1250 | 4 | Here. | 4-4 x 5 1/2 | Gas. | 1 | Hart-Parr...20 | 20 | 765 | 4 | Own | 2-5 1/2 x 6 1/2 | K,D | 2 | Samson.....M | .... | 445 | 4 | Own | 4-4 x 5 1/2 | G,K | 2 |
| Avery, S.R. Cul. | 6-10 | .... | 4 | Own | 4-3 x 4 | G,K | .... | Hart-Parr...30 | 30 | 895 | 4 | Own | 2-6 1/2 x 7 | K,D | 3 | Sandusky.....J | 10-20 | 1250 | 4 | Own | 4-4 1/2 x 5 1/2 | G,K,D | 2 |
| Avery, Cult-C. | .... | .... | 3 | Own | 0-3 x 4 | G,K | .... | Hart-Parr...18 | 18 | 1695 | 4 | Own | 0 1/2 x 7 | K,D | .... | Sandusky.....E | 15-35 | 1750 | 4 | Own | 4-5 x 6 1/2 | G,K,D | 4 |
| Avery.....B | 6-10 | .... | 4 | Own | 0-3 x 4 | G,K | 2 | Heider.....D | 0-16 | 870 | 4 | Wauk | 4-4 1/2 x 6 1/2 | G,K | .... | Shelby.....D | 15-30 | .... | 4 | Beav. | 4-4 1/2 x 6 | G,K | 3 |
| Avery.....C | .... | .... | 4 | Own | 0-3 x 4 | G,K | .... | Heider.....C | 12-20 | 995 | 4 | Wauk | 4-4 1/2 x 6 1/2 | G,K | 3 | Shelby.....C | 9-18 | .... | 4 | Wauk | 4-3 1/2 x 5 1/2 | G or K | 2 |
| Avery..... | 8-16 | .... | 4 | Own | 2-5 1/2 x 6 | G,K,D | 2-3 | Heider.....Cult | 5-10 | 800 | 4 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 1 | Steady Pull.. | 12-24 | 1485 | 4 | Own | 4-4 x 5 | Gas. | 3 |
| Avery..... | 12-20 | .... | 4 | Own | 4-4 1/2 x 6 | G,K,D | 3-4 | Huber Light 4 | 12-25 | 1185 | 4 | Wauk | 4-4 1/2 x 5 1/2 | G or K | 3 | Stinson.....4E | 18-36 | 1835 | 4 | Beav. | 4-4 1/2 x 6 | G,K | 4 |
| Avery..... | 12-25 | .... | 4 | Own | 4-4 1/2 x 6 | G,K,D | 3-4 | Huber Super 4 | 15-30 | 1885 | 4 | Midw. | 4-4 1/2 x 6 | Gas. | 3 | | | | | | | | |
| Avery..... | 14-28 | .... | 4 | Own | 4-4 1/2 x 6 | G,K,D | 3-4 | | | | | | | | | Tioga.....3 | 18-32 | .... | 4 | Wisc. | 4-4 1/2 x 6 | Gas. | 3-4 |
| Avery..... | 18-36 | .... | 4 | Own | 4-5 1/2 x 6 | G,K,D | 4-5 | Illinois.....C | 15-30 | .... | 4 | Clim. | 4-5 x 6 1/2 | G,K | 4 | Topp-Stewart. | 30-45 | .... | 4 | Wauk | 4-4 1/2 x 6 1/2 | Gas. | 3-4 |
| Avery..... | 25-50 | .... | 4 | Own | 4-6 1/2 x 7 | G,K,D | 5-6 | Imperial.....E | 10-40 | 4500 | 4 | Own | 4-7 1/2 x 8 | G,K,D | 10 | Toro Cultivator | 6 | 750 | 3 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 2 |
| Avery..... | 45-65 | .... | 4 | Own | 4-7 1/2 x 8 | G,K,D | 8-10 | Indiana.....F | 5-10 | 685 | 2 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 1-2 | Toro Tractor 22 | 6-10 | 495 | 3 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 2 |
| | | | | | | | | International | 8-16 | 1670 | 4 | Own | 4-4 1/2 x 5 | G,K,D | 2 | Townsend..... | 10-20 | 800 | 2 | Own | 4-6 1/2 x 7 | Ker. | 2-3 |
| | | | | | | | | Internat. Titan | 10-20 | 1780 | 4 | Own | 2-6 1/2 x 8 | G,K,D | 2 | Townsend..... | 15-30 | 1350 | 2 | Own | 4-7 x 8 | Ker. | 3-4 |
| | | | | | | | | International.. | 15-30 | 1750 | 4 | Own | 4-5 1/2 x 8 | G,K,D | 4 | Townsend..... | 25-50 | 2500 | 2 | Own | 4-8 1/2 x 10 | Ker. | 4-8 |
| Bates Mule..H | 15-25 | .... | 4 | Midw. | 4-4 1/2 x 5 1/2 | Gas. | 3 | J-T.....N | 20-40 | .... | *2 | Clim. | 4-5 1/2 x 6 1/2 | G,K,D | 3-4 | Traction Motor | 40-50 | .... | 4 | .... | 8-3 1/2 x 6 | Gas. | 4-5 |
| Bates Mule..F | 18-25 | .... | *2 | Midw. | 4-4 1/2 x 5 1/2 | Gas. | 3 | | | | | | | | | Traylor.....TB | 6-12 | 500 | 4 | LeR. | 4-3 1/2 x 4 1/2 | Gas. | 1-2 |
| Bates MuleG | 25-35 | .... | *2 | Midw. | 4-4 1/2 x 6 | Gas. | .... | Lauson.....5 | 12-25 | 1495 | 4 | Midw. | 4-4 1/2 x 5 1/2 | Gas. | 3 | Trundar.....10 | 25-40 | 3750 | *2 | Wauk | 4-5 x 6 1/2 | G or K | 4 |
| Beeman.....G | 2-4 | 240 | 4 | Own | 1-3 1/2 x 4 1/2 | Gas. | .... | Lauson.....20 | 15-25 | 1495 | 4 | Beav. | 4-4 1/2 x 6 | G or K | 3-4 | Twin City..... | 12-20 | 1200 | 4 | Own | 4-4 1/2 x 6 | G,K | 3 |
| Best..... | 18-30 | 3100 | *2 | Own | 4-4 1/2 x 6 1/2 | G,K,D | 4 | Lauson.....21 | 15-30 | 1875 | 4 | Beav. | 4-4 1/2 x 6 | G or K | 3-4 | Twin City..... | 20-35 | 2750 | 4 | Own | 4-5 1/2 x 6 1/2 | G,K | 5-6 |
| Best..... | 60 | 5450 | *2 | Own | 4-6 1/2 x 6 1/2 | G,K,D | 8-9 | Lauson Road | 15-30 | 2100 | 4 | Beav. | 4-4 1/2 x 6 | G or K | 3-4 | Twin City..... | 40-65 | 4750 | 4 | Own | 4-7 1/2 x 8 | G,K | 8-10 |
| Boring.....1921 | 18-30 | 1850 | 3 | Wauk | 4-4 1/2 x 5 1/2 | G or K | 2 | Leader..... | 12-18 | 685 | 4 | Own | 2-6 x 6 1/2 | G,K,D | 2-3 | Uncle Sam C20 | 12-20 | 1295 | 4 | Weid. | 4-4 x 5 1/2 | G | 2-3 |
| Burn-Oil, 1922 | 15-30 | 1435 | 4 | Own | 2-6 1/2 x 7 | Ker. | 3-4 | Leader.....GU | 16-32 | 1725 | *2 | Clim. | 4-5 x 6 1/2 | G,K | 3-4 | Uncle Sam B19 | 20-30 | 1895 | 4 | Beav. | 4-4 1/2 x 6 | G or K | 3-4 |
| | | | | | | | | Linn.....H4J | 40-45 | 4500 | *2 | Cont. | 4-4 1/2 x 5 1/2 | Gas. | 4 | Uncle Sam D21 | 20-30 | 1895 | 4 | Beav. | 4-4 1/2 x 6 | G or K | 3-4 |
| Capital..... | 15-30 | 1000 | 2 | Own | 4-4 1/2 x 6 | Gas. | 3 | Linn.....W | 60 | 5000 | 4 | Wauk | 4-5 x 6 1/2 | Gas. | 6 | Utiliter.....501 | 2 1/2-4 | 295 | 4 | Own | 1-3 1/2 x 4 1/2 | G | 1 |
| Case..... | 10-18 | 700 | 4 | Own | 4-3 1/2 x 5 | G or K | 2 | Little Giant..A | 16-22 | 2200 | 4 | Own | 4-5 1/2 x 6 | K | 4 | Utiliter.....501A | 2 1/2-4 | 340 | 4 | Own | 1-3 1/2 x 4 1/2 | G | 1 |
| Case..... | 12-20 | 1050 | 4 | Own | 4-4 1/2 x 5 | G,K,D | 2 | Little Giant..B | 26-35 | 3300 | 4 | Own | 4-5 1/2 x 6 | K | 4 | Vim.....B1A | 15-30 | 1100 | 4 | Wauk | 4-4 1/2 x 5 1/2 | G,K | 3 |
| Case..... | 15-27 | 1320 | 4 | Own | 4-4 1/2 x 6 | G or K | 3-4 | Lombard 1922 | 85-150 | 8950 | *2 | Wisc. | 6-5 1/2 x 6 1/2 | Gas. | 16 | Wallis.....K | 15-25 | 1995 | 4 | Own | 4-4 1/2 x 5 1/2 | G,K | 3 |
| Case..... | 22-40 | 2550 | 4 | Own | 4-5 1/2 x 6 1/2 | G or K | 4-5 | Lombard 1922 | 50 | 5300 | *2 | Wisc. | 4-4 1/2 x 6 1/2 | Gas. | 6-10 | Waterloo.....N | 12-25 | 675 | 4 | Own | 2-6 1/2 x 7 | Ker. | 3 |
| Case.....40-72 | 40-72 | 5200 | 4 | Own | 7 x 8 | G,K,D | 8-10 | | | | | | | | | Wetmore21-22 | 12-25 | 1185 | 4 | Wauk | 4-4 x 5 1/2 | G,K | 3 |
| Caterpillar 5T | 25-35 | .... | *2 | Own | 4-4 1/2 x 6 | Gas. | 4 | Master Jr..... | 5-10 | 585 | .. | LeR. | 2-5 1/2 x 4 | Gas. | 1 | Whitney.....D | 9-18 | 595 | 4 | Own | 2-5 1/2 x 6 1/2 | Gas. | 2 |
| Caterpillar 10T | 40 | .... | *2 | Own | 4-6 1/2 x 7 | Gas. | 6 | MerryGar1922 | 2 | 210 | 2 | Evin | 1-2 1/2 x 2 1/2 | Gas. | .. | Wichita.....T | 15-30 | 2000 | 4 | Beav. | 4-4 1/2 x 6 | G,K,D | 3-4 |
| Caterpillar T35 | 15-25 | .... | 2 | Own | 4-4 1/2 x 5 1/2 | Gas. | 3 | Minne.....All-P | 12-25 | 800 | 4 | Own | 4-4 1/2 x 7 | G or K | 3 | Wisconsinin..F | 16-30 | 1850 | 4 | Clim. | 4-5 x 6 1/2 | G or K | 3 |
| Centaur..... | 6-2 1/2 | 345 | 2 | N Way | 2-4 1/2 x 5 1/2 | G or K | 1 | Minne.....Gen.P | 17-30 | 1600 | 4 | Own | 4-4 1/2 x 7 | G or K | 3-4 | Wisconsinin..E | 20-40 | 2050 | 4 | Wauk | 4-5 x 6 1/2 | G or K | 4 |
| Chicago.....40 | 40 | 2500 | 4 | Own | 4-4 1/2 x 6 | G,K,D | 2 | Minne.....Med.D | 22-44 | 2650 | 4 | Own | 4-6 x 7 | G or K | 5-6 | Wisconsinin..H | 22-40 | 2550 | 4 | Clim. | 4-5 1/2 x 7 | G or K | 4-6 |
| Cletrac.....9 | 9-16 | 595 | *2 | Own | 4-3 1/2 x 4 1/2 | G,K,D | 2 | MinneHeavyD | 35-70 | 3850 | 4 | Own | 4-7 1/2 x 9 | G or K | 8-9 | | | | | | | | |
| Cletrac.....W | 12-20 | 1345 | *2 | Own | 4-4 x 5 1/2 | G,K,D | 2-3 | Mohawk. 1922 | 8-16 | 650 | 2 | Light | 4-3 1/2 x 4 1/2 | G or K | 1-2 | Yuba.....12-20 | 12-20 | 2400 | *2 | Wisc. | 4-4 1/2 x 6 1/2 | G,K,D | 3 |
| | | | | | | | | Moline Univ D | 9-18 | .... | 2 | Own | 4-3 1/2 x 5 | Gas. | 2-3 | Yuba.....15-25 | 15-25 | 2750 | *2 | Wisc. | 4-4 1/2 x 6 1/2 | G,K,D | .. |
| | | | | | | | | Moline Orch.. | 9-18 | .... | 2 | Own | 4-3 1/2 x 5 | Gas. | 2-3 | Yuba.....20-35 | 20-35 | 3900 | *2 | Wisc. | 4-5 1/2 x 7 | G,K,D | 4 |
| | | | | | | | | Motor Macauli. | 1 1/2 | 195 | 2 | Own | 1-2 1/2 x 3 1/2 | Gas. | .. | Yuba.....25-40 | 25-40 | 4250 | *2 | Wisc. | 4-5 1/2 x 7 | G,K,D | .. |
| | | | | | | | | | | | | | | | | Yuba..... | 25-40 | 4750 | *2 | Yuba | 4-5 1/2 x 7 | D | .. |
| Dakota.....4 | 15-27 | 1500 | 3 | Dom. | 4-4 1/2 x 6 | Gas. | 3 | NB.....1 | 3-6 | 425 | 4 | Own | 2-3 1/2 x 4 | Gas. | 1 | Zelle..... | 12-25 | .... | 4 | Buda | 4-4 1/2 x 5 1/2 | G or K | 3 |
| Depue.....A | 20-30 | 2500 | 4 | Buda | 4-4 1/2 x 6 | Gas. | 4 | Nichels-Shep. | 20-42 | 2650 | 4 | Own | 8 x 10 | G or K | 3-6 | | | | | | | | |
| Dill.....D | 20 | 2380 | 4 | Cont. | 4-4 1/2 x 5 1/2 | Gas. | 3 | Nichels Shep. | 25-50 | 3000 | 4 | Own | 9 x 12 | G or K | 4-7 | | | | | | | | |
| Dill.....R.W. | 20 | 2980 | 4 | Midw. | 4-4 1/2 x 6 | Gas. | 3 | Nilson Senior. | 20-40 | 1975 | 5 | Wauk | 4-5 x 10 | G,K | 4 | | | | | | | | |
| Do-It-All..A | 3-6 | 495 | .. | Own | 1-4 1/2 x 5 | Gas. | 1 | | | | | | | | | | | | | | | | |
| | | | | | | | | Oil Pull.....K | 12-20 | .... | 4 | Own | 2-6 x 8 | K,D | 3 | | | | | | | | |
| Eagle.....F | 12-22 | .... | 4 | Own | 2-7 x 8 | G or K | 3-4 | Oil Pull.....H | 10-30 | .... | 4 | Own | 2-7 x 8 1/2 | K,D | 4 | | | | | | | | |
| Eagle.....H | 16-30 | .... | 4 | Own | 2-8 x 8 | G or K | 4-5 | Oil Pull.....G | 20-40 | .... | 4 | Own | 2-8 x 10 | D | 5-6 | | | | | | | | |
| E-B.....E | 12-20 | 1095 | 4 | Own | 4-4 1/2 x 5 | G,K,D | 3 | Oil Pull.....E | 30-60 | .... | 4 | Own | 2-10 1/2 x 12 | K,D | 8-10 | | | | | | | | |
| E-B.....Q | 12-20 | 750 | 4 | Own | 4-4 1/2 x 5 | G,K,D | 3 | Oldsmar G&K | 2 1/2-5 | 225 | 4 | Own | 1-5 1/2 x 5 1/2 | Gas. | 1 | | | | | | | | |
| E-B..... | 16-32 | 1750 | 4 | Own | 4-5 1/2 x 7 | G,K,D | 4 | Oshkosh..M | 6-12 | 650 | 2 | Own | 2-4 x 6 | G,K | 1 | | | | | | | | |